MCQs for Handbook of Local Anesthesia
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For students, a good way to test their understanding and knowledge about a particular subject and to prepare for exams is to practice using Multiple Choice Questions (MCQs). This book on *MCQs for Handbook of Local Anesthesia* has been written keeping in mind the above purpose.

In this book Elsevier has worked with professional question writers to prepare a collection of 500 MCQs to accompany the subject matter covered in each chapter of the textbook, *Handbook of Local Anesthesia*, 6th edition by Stanley F. Malamed (ISBN: 978-0-323-07413-1). The style of MCQs is three distractors and one correct answer so the student will need to mark the correct option accordingly. Each chapter is followed by a feedback section showing the correct answers and a very quick rationale why each answer is correct or incorrect thus elevating student’s confidence to answer many more MCQs on the subject. Below each rationale, reference to the page number of the main textbook, *Handbook of Local Anesthesia*, is given for the students who want to revise or study the particular topic again.

The aim for the student is to get as many correct as possible, and to revise any subject area where the number of correct marks is low. We sincerely hope that students will find the book extremely useful. We welcome comments and suggestions from students and teachers, which will help in improving this book further.

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Neurophysiology

Multiple Choice

1. Local anesthesia is associated with which effect?
   a. Tissue irritation.
   b. Unconsciousness.
   c. Irreversible onset.
   d. Loss of sensation.

2. The basic structural unit of the nervous system is the
   a. neuron.
   b. osteon.
   c. sarcomere.
   d. keratinocyte.

3. Efferent nerve cells are distinguished by which characteristic?
   a. A thin nerve membrane encases the axon.
   b. The cell body provides metabolic support for the cell.
   c. The cell body lies directly between the axon and the dendrites.
   d. Free nerve endings form a treelike arrangement in the dendritic zone.

4. Which cellular component is critical to nerve conduction?
   a. Nucleus.
   b. Axoplasm.
   c. Axolemma.
   d. Myelin sheath.

5. As it travels along a nerve fiber, the strength of an impulse
   a. remains constant.
   b. rapidly increases.
   c. steadily decreases.
   d. gradually increases.

6. The firing threshold of nerve excitation is characterized by
   a. slow depolarization.
   b. rapid depolarization.
   c. gradual repolarization.
   d. reversal of electrical potential.
7. Local anesthetics produce which effect on the nerve membrane?
   a. Less sodium is required to achieve repolarization.
   b. More sodium is required to achieve depolarization.
   c. Less potassium is required to achieve depolarization.
   d. More potassium is required to achieve repolarization.

8. The combined depolarization and repolarization of a nerve membrane takes
   a. 1 s.
   b. 0.7 s.
   c. 1 msec.
   d. 0.3 msec.

9. Which statement is true?
   b. Chloride ions are too large to pass through resting nerve membrane channels.
   c. Membrane channels are external passages located outside the nerve membrane.
   d. Sodium channel gates are located near the internal surface of the nerve membrane.

10. Which prevents retrograde (backward) impulse propagation?
    a. Ranvier nodes.
    b. Refractory period.
    c. Membrane channels.
    d. Saltatory conduction.

11. A neural impulse travels
    a. rapidly in myelinated nerves.
    b. sporadically in unmyelinated nerves.
    c. by leaping from node to node in unmyelinated nerves.
    d. by adjacent depolarization of nerve membrane in myelinated nerves.

12. In order to inhibit impulse transmission in a myelinated nerve, the anesthetic solution must cover how many millimeters of nerve fiber?
    a. 1–2.
    b. 3–5.
    c. 6–7.
    d. 8–10.

13. Which phase of the action potential is most profoundly affected by local anesthesia?
    a. Resting.
    b. Repolarization.
    c. Slow depolarization.
    d. Rapid depolarization.

14. Which theory is most widely accepted to explain the mechanism of action of local anesthesia?
    a. Acetylcholine.
    b. Specific receptor.
    c. Membrane expansion.
    d. Calcium displacement.
15. Most injectable dental anesthetics bind to receptor sites at which location?
   a. Activation gate.
   b. Inactivation gate.
   c. Within the sodium channel.
   d. On the outer surface of the sodium channel.

16. Which is the first step of anesthetic action?
   a. Impulse conduction obstruction.
   b. Reduced rate of electrical depolarization.
   c. Displacement of calcium ions from the sodium channel.
   d. Attachment of the local anesthetic molecule to sodium channel receptor sites.

17. Which is true with regard to the pH of local anesthetics?
   a. Epinephrine-containing anesthetic solutions are acidic.
   b. Anesthetic solutions that do not contain epinephrine are basic.
   c. Alkalinized anesthetic solutions produce a burning sensation on injection.
   d. Highly acidic anesthetic solutions produce a rapid onset of anesthesia.

18. Which anesthetic solution facilitates the most comfortable and effective injection?
   a. 3% mepivacaine HCl with a pH 4.5.
   b. 0.5% bupivacaine HCl with a pH 6.5.
   c. 2% lidocaine/epinephrine with a pH 3.85.
   d. 4% articaine HCl/epinephrine/buffer with a pH 7.35.

19. In the presence of tissue inflammation or infection, local anesthesia is
   a. nearly twice as potent.
   b. more rapidly achieved.
   c. more difficult to achieve.
   d. likely to spread the infection.

20. Which is the primary diffusion barrier in a peripheral nerve?
   a. Fasciculi.
   b. Perilemma.
   c. Epineurium.
   d. Endoneurium.

21. Each is true with respect to mantle bundles, EXCEPT one. Which is the EXCEPTION?
   a. Found near the surface of the nerve.
   b. Exposed to a high concentration of local anesthetic.
   c. Blocked completely, soon after an anesthetic injection.
   d. Innervate the most distal tissues of a nerve distribution.

22. Induction time spans from
   a. conduction blockage to complete repolarization.
   b. injection of anesthetic solution to conduction blockade.
   c. excitation of a nerve segment to the attainment of firing threshold.
   d. termination of an action potential to the restoration of resting potential.
23. Which factor is linked to the potency of a local anesthetic?
   a. Lipid solubility.
   b. Extent of protein binding.
   c. Dissociation constant (pK_a).
   d. Diffusibility through nonnervous tissue.

24. Which statement is true with regard to recovery from local anesthesia?
   a. Recovery from anesthesia occurs more rapidly than induction.
   b. Core bundles remain anesthetized for longer than mantle bundles.
   c. Steps for induction and emergence from local anesthesia are identical.
   d. Mantle bundle fibers begin to gain sensation before the core bundles.

25. Which reduces the duration of anesthesia?
   a. Tachyphylaxis.
   b. Decreased vascularity.
   c. Increased protein binding.
   d. Addition of a vasopressor.

**Feedback**

1. ANS: d
   a. Modern local anesthetics are reasonably nonirritating to the tissue.
   b. Local anesthesia is a loss of tissue sensation while conscious.
   c. Local anesthesia is temporary and entirely reversible.
   d. Correct. Local anesthesia produces a completely reversible, nonirritating loss of sensation, without a loss of consciousness.

   REF: p. 2

2. ANS: a
   a. Correct. Neurons are the basic structural units of the nervous system.
   b. Osteons are the basic structural cells of the skeletal system.
   c. Sarcomeres are the basic structural units of the muscular system.
   d. Keratinocytes are the basic structural cells of the epidermis.

   REF: p. 3

3. ANS: c
   a. The nerve membrane, or axolemma, is present in both efferent and afferent neurons.
   b. The cell body provides metabolic support in both efferent and afferent neurons.
   c. Correct. Motor neurons (efferent nerve cells) can be identified by the position of the cell body, which is in line with the axon and the dendrites. In sensory neurons, the cell body is located at a distance from the axon.
   d. Dendrites form an arborization, or treelike arrangement, of free nerve endings in both efferent and afferent neurons.

   REF: p. 4
4. ANS: c
   a. The cell body and nucleus are not crucial for nerve conduction; the axolemma is.
   b. The axoplasm is not responsible for nerve conduction; the axolemma is.
   c. Correct. The nerve membrane, or axolemma, is crucial for nerve conduction.
   d. The myelin sheath, although instrumental in increasing the rate of nerve impulses, is not crucial for nerve conduction.

REF: p. 4

5. ANS: a
   a. Correct. The strength of a neural impulse remains constant as it travels along the nerve fiber.
   b. Even when the stimulus increases, the strength of the generated neural impulse remains constant as it travels along the nerve fiber.
   c. Even when the stimulus decreases, the strength of the generated neural impulse remains constant as it travels along the nerve fiber.
   d. The neural impulse that travels along the nerve fiber remains constant, without increasing or decreasing in strength.

REF: p. 6

6. ANS: b
   a. The initial phase of nerve excitation is characterized by slow depolarization.
   b. Correct. Firing threshold is a phase of very rapid depolarization.
   c. Gradual repolarization is the final phase of nerve excitation in which resting potential is restored.
   d. Firing threshold is a phase of rapid depolarization, which eventually propagates the following phase of nerve excitation—a reversal of electrical potential.

REF: pp. 6–7

7. ANS: b
   a. Local anesthetics increase the firing threshold. More, not less, sodium is then required to achieve depolarization.
   b. Correct. Nerves exposed to local anesthesia have an elevated firing threshold; more sodium is required to elicit depolarization.
   c. Local anesthetics increase the firing threshold by binding to the sodium, not potassium, channel.
   d. Local anesthetics increase the firing threshold by binding to the sodium channel. More sodium is then required to achieve depolarization.

REF: p. 8
8. **ANS**: c  
   a. The depolarization and repolarization of a nerve membrane takes 1 msec, or one thousandth of 1 s.  
   b. The depolarization and repolarization of a nerve membrane takes 1 msec, or one thousandth of 1 s.  
   c. **Correct.** Excitation of the nerve membrane, including depolarization (0.3 msec) and repolarization (0.7 msec), takes 1 msec.  
   d. Depolarization occurs in 0.3 msec; repolarization takes more than twice that—0.7 msec. Together, the depolarization and repolarization of a nerve membrane occur in 1 msec.  

   **REF**: p. 7

9. **ANS**: a  
   a. **Correct.** Nerve membrane channels widen temporarily during depolarization, permitting the rapid passage of sodium ions.  
   b. Chloride and potassium ions are small enough to pass through nerve membrane channels, even when the nerve is at rest.  
   c. Membrane channels are positioned within the nerve membrane.  
   d. Sodium channel gates are located near the external surface of the nerve membrane.  

   **REF**: pp. 8–9

10. **ANS**: b  
   a. The direction of impulse propagation is a result of the refractory period, not the nodes of Ranvier.  
   b. **Correct.** A nerve is unable to respond to another stimulus for a time after excitation in the refractory period, thereby preventing backward impulse propagation.  
   c. Membrane channels control the permeability of the nerve membrane, not the direction of impulse propagation.  
   d. Saltatory conduction concerns the speed, not the direction, of impulse propagation.  

   **REF**: p. 10

11. **ANS**: a  
   a. **Correct.** A neural impulse travels between 14 and 120 times faster in myelinated nerves than in unmyelinated nerves.  
   b. A neural impulse travels predictably, following the spread of depolarization to adjacent nerve membrane, in unmyelinated nerve fibers.  
   c. Myelinated nerve fibers propagate current impulses via saltatory conduction, meaning the impulse leaps from node to node.  
   d. Unmyelinated nerve fibers propagate current impulses by sequential depolarization of the adjacent nerve membrane.  

   **REF**: p. 10
12. ANS: d
   a. 1–2 mm is inadequate for profound anesthesia. In a myelinated nerve, the current can leap over a blocked node to continue impulse propagation.
   b. 3–5 mm is inadequate for profound anesthesia. In a myelinated nerve, the current can leap over a blocked node to continue impulse propagation.
   c. 6–7 mm is inadequate for profound anesthesia. In a myelinated nerve, the current can leap over a blocked node to continue impulse propagation.
   d. Correct. Anesthetic solutions must envelop 8–10 mm of the myelinated nerve fiber to ensure profound anesthesia.

REF: pp. 11–12

13. ANS: c
   a. Local anesthetics act principally on the slow depolarization, not resting, period of the action potential.
   b. Local anesthetics act principally on the slow depolarization, not repolarization, period of the action potential.
   c. Correct. Local anesthetics impede the rate of depolarization, especially the period of slow depolarization.
   d. Local anesthetics act principally on the slow, not rapid, depolarization period of the action potential.

REF: p. 11

14. ANS: b
   a. Current evidence does not support the acetylcholine theory.
   b. Correct. The specific receptor theory, which holds that anesthetics bind to sodium channel receptors, is currently the most widely believed theory used to explain how local anesthetics work.
   c. The membrane expansion theory is credible; however, the specific receptor theory is most widely subscribed to.
   d. Current evidence has undermined the once popular calcium displacement theory.

REF: p. 11

15. ANS: c
   a. Various venoms, including scorpion venom, act on the activation gate.
   b. Sea anemone venoms act on the inactivation gate.
   c. Correct. Most local anesthetics used in dentistry bind to specific receptor sites found within the sodium channel.
   d. Biotoxins, such as tetrodotoxin, bind to specific receptor sites located on the outer surface of the sodium channel.

REF: p. 11
16. ANS: c  
   a. Impulse conduction obstruction is the final step in the sequence of anesthetic action.  
   b. Electrical depolarization is depressed as a result of binding local anesthetic molecules to  
      the sodium channel receptor sites, which occurs only after calcium ions are displaced  
      from these receptors.  
   c. Correct. The first step in the sequence of anesthetic action is displacement of calcium  
      ions from specific receptor sites found within the sodium channel.  
   d. Local anesthetic molecules can only attach to the sodium channel receptor sites once the  
      calcium ions have been displaced from these receptors.

REF: p. 14

17. ANS: a  
   a. Correct. Local anesthetic solutions that contain epinephrine are acidic, with a pH of  
      about 3.5.  
   b. Anesthetic solutions, even without epinephrine, are slightly acidic, with a pH of about  
      6.5.  
   c. The more alkalinized an anesthetic solution is, the less likely the injection is to cause a  
      burning sensation upon injection.  
   d. The more acidic an anesthetic solution is, the slower the onset of anesthesia.

REF: p. 15

18. ANS: d  
   a. An anesthetic solution with an acidic pH of 4.5 is less likely than one with an alkaline  
      pH of 7.35 to provide comfortable and effective anesthesia.  
   b. An anesthetic solution with an acidic pH of 6.5 is less likely than one with an alkaline  
      pH of 7.35 to provide comfortable and effective anesthesia.  
   c. An anesthetic solution with an acidic pH of 3.85 is less likely than one with an alkaline  
      pH of 7.35 to provide comfortable and effective anesthesia.  
   d. Correct. Because the pH of healthy tissue is 7.4, the use of a buffered anesthetic solution  
      with an alkaline pH of 7.35 facilitates a comfortable and effective injection with a speedy  
      onset of anesthesia.

REF: pp. 15–16

19. ANS: c  
   a. Local anesthesia is not more potent when anesthetic is injected in inflamed tissue.  
   b. Local anesthesia is not rapidly achieved when anesthetic is injected in inflamed tissue.  
   c. Correct. Local anesthesia is more difficult to accomplish in tissues that are infected or  
      inflamed.  
   d. Local anesthesia is sterile, and not associated with the spread of infection in inflamed  
      tissue.

REF: pp. 17–18
20. ANS: b
   a. The perilemma is the primary barrier for diffusion into the nerve; the fasciculi are bundles of individual nerve fibers.
   b. Correct. The innermost layer of perineurium, the perilemma, is the greatest obstacle for diffusion of an anesthetic solution into a nerve.
   c. The epineurium is a loose network of connective tissue through which anesthetic solutions easily diffuse.
   d. The endoneurium covers individual nerve fibers, but is not the primary diffusion barrier; the perilemma is the main diffusion barrier for the nerve.

REF: pp. 18–19

21. ANS: d
   a. Mantle bundles are located near the outer surface of the nerve.
   b. Because of their location, mantle bundles are exposed to a high concentration of diffuse anesthetic solution.
   c. Mantle bundles are completely blocked soon after an anesthetic injection.
   d. Correct. Mantle bundles innervate the most proximal (nearest) tissues of nerve distribution.

REF: p. 19

22. ANS: b
   a. Induction time ends, rather than begins, when conduction blockage is reached.
   b. Correct. Induction time is the length of time required to reach conduction blockade from the initial injection of anesthetic solution.
   c. Impulse propagation, not blockage, results from the excitation of a nerve segment to the attainment of firing threshold. Induction time refers to conduction blockade, not propagation.
   d. Repolarization begins with the termination of an action potential; induction time begins with the injection of anesthetic solution.

REF: p. 20

23. ANS: a
   a. Correct. A local anesthetic with greater lipid solubility facilitates increased nerve membrane penetration and thereby increased potency.
   b. The duration of anesthetic activity is linked to the anesthetic’s ability to attach securely to protein receptor sites.
   c. The rate of onset of an anesthetic is affected by the dissociation constant (pKₐ).
   d. The rate of onset of an anesthetic is affected by the ability of the anesthetic to diffuse through nonnervous tissue.

REF: p. 20

24. ANS: d
   a. Recovery from anesthesia occurs more slowly than induction.
   b. Anesthetic in the core bundles diffuses into the mantle bundles making the core bundles the first to recover from anesthesia.
   c. Steps for recovery from anesthesia are the reverse of those for induction.
   d. Correct. Mantle bundle fibers begin to gain sensation before those in the core bundles.

REF: p. 20
25. ANS: a
a. Correct. Tachyphylaxis, the increased tolerance of a readministered drug, significantly reduces the duration of local anesthesia.
b. Decreased vascularity increases the duration of local anesthesia by reducing the diffusion, dispersion, and uptake of the drug.
c. Anesthetic drugs with a strong affinity for protein binding produce a longer-acting anesthetic effect.
d. The addition of a vasopressor increases the duration of anesthesia by decreasing tissue perfusion.

REF: p. 23
Pharmacology of Local Anesthetics

Multiple Choice

1. Local anesthetics must enter the bloodstream to elicit a pharmacologic effect. Once in the bloodstream, anesthetic drugs are transported to every part of the body.
   a. Both statements are true.
   b. Both statements are false.
   c. The first statement is true; the second is false.
   d. The first statement is false; the second is true.

2. Which local anesthetic is the strongest vasodilator?
   a. Procaine.
   b. Prilocaine.
   c. Lidocaine.
   d. Mepivacaine.

3. Which route of anesthetic administration is LEAST likely to facilitate an overdose?
   a. Topical.
   b. Intravenous.
   c. Intramuscular.
   d. Subcutaneous.

4. Which tissue absorbs the largest percentage of local anesthetic from the bloodstream?
   a. Liver.
   b. Brain.
   c. Cortical bone.
   d. Skeletal muscle.

5. The half-life of a local anesthetic is the rate at which the drug is
   a. administered.
   b. distributed to the tissues.
   c. removed from the bloodstream.
   d. absorbed into the circulatory system.

6. Each statement is correct, EXCEPT one. Which is the EXCEPTION?
   a. Amide local anesthetics are hydrolyzed in the plasma.
   b. Amide local anesthetics cross the blood–brain barrier easily.
   c. Ester local anesthetics readily cross the placenta.
   d. Ester local anesthetics are more toxic for those with atypical pseudocholinesterase.
7. Which local anesthetic undergoes biotransformation in the liver and the blood?
   a. Articaine.
   b. Prilocaine.
   c. Lidocaine.
   d. Etidocaine.

8. A surge of by-products from the metabolism of lidocaine produces which clinical effect?
   a. Sedation.
   b. Anesthesia.
   c. Methemoglobinemia.
   d. Tonic–clonic seizure.

9. Renal disease impacts which aspect of local anesthesia?
   a. Uptake.
   b. Excretion.
   c. Metabolism.
   d. Distribution.

10. The primary clinical manifestation of local anesthetic overdose is
    a. Syncope.
    b. Convulsion.
    c. Tachycardia.
    d. Hallucination.

11. Which body system is most vulnerable to the effects of local anesthetics?
    a. Urinary.
    b. Nervous.
    c. Circulatory.
    d. Reproductive.

12. Which is NOT a direct result of central nervous system (CNS) depression?
    a. Slurred speech.
    b. Lightheadedness.
    c. Muscular twitching.
    d. Bilateral tongue numbness.

13. When carbon dioxide (CO\textsubscript{2}) levels in the bloodstream
    a. Increase, the duration of an anesthetic-related seizure is decreased.
    b. Decrease, the duration of an anesthetic-related seizure is increased.
    c. Increase, the amount of local anesthetic needed to elicit a seizure is decreased.
    d. Decrease, the amount of local anesthetic needed to elicit a seizure is decreased.

14. Which sequence follows high local anesthetic blood levels?
   a. Tonic–clonic seizures, excitation or sedation, respiratory arrest, CNS depression.
   b. Excitation or sedation, tonic–clonic seizures, CNS depression, respiratory arrest.
   c. CNS depression, respiratory arrest, excitation or sedation, tonic–clonic seizures.
   d. Respiratory arrest, CNS depression, tonic–clonic seizures, excitation or sedation.
15. Which best describes neuron function at preconvulsive local anesthetic blood levels?
   a. Selective depression of inhibitory pathways.
   b. Complete depression of inhibitory pathways.
   c. Selective depression of facilitatory pathways.
   d. Complete depression of inhibitory and facilitatory pathways.

16. When administered intravenously, local anesthetics
   a. induce hypertension.
   b. provide a degree of analgesia.
   c. produce myocardial excitation.
   d. decrease the pain reaction threshold.

17. Which local anesthetic is most widely used to manage cardiac dysrhythmias?
   a. Articaine.
   b. Lidocaine.
   c. Benzocaine.
   d. Bupivacaine.

18. Vasoconstriction is a characteristic of which drug?
   a. Cocaine.
   b. Procaine.
   c. Etidocaine.
   d. Mepivacaine.

19. Mild hypotension is expected with which amount of local anesthetic?
   a. Overdose.
   b. Lethal dose.
   c. Therapeutic dose.
   d. Approaching overdose.

20. Which statement is correct?
   a. Skeletal muscle damage associated with local anesthetics is permanent.
   b. Short-acting local anesthetics cause the most damage to skeletal muscle.
   c. Clinical signs of local irritation are not linked to skeletal muscle damage.
   d. Intraoral injections of local anesthetic do not cause skeletal muscle damage.

21. With a therapeutic dose of local anesthetic, respiratory function
   a. increases mildly.
   b. remains unaltered.
   c. arrests completely.
   d. decreases significantly.

22. Which best describes the likelihood of acquiring prolonged muscle paralysis from dental local anesthesia?
   a. Very probable.
   b. Likely.
   c. Unlikely.
   d. Very improbable.
23. When succinylcholine is present in the system, ester local anesthetics elicit which reaction?
   a. Prolonged apnea.
   b. Unexpected acute tachycardia.
   c. Accelerated metabolism of the local anesthetic.
   d. Amplified CNS depression.

24. The predominant factor in acquiring malignant hyperthermia is
   a. age.
   b. genetics.
   c. liver damage.
   d. immunodeficiency.

25. How often do amide local anesthetics provoke malignant hyperthermia?
   a. Regularly.
   b. Occasionally.
   c. Rarely.
   d. Never.

Feedback

1. ANS: d
   a. The first statement is false; local anesthetics only elicit the desired pharmacologic effect before they are absorbed into the bloodstream.
   b. The second statement is true; anesthetic drugs in the circulatory system are carried throughout the body.
   c. The first statement is false; the second statement is true.
   d. Correct. The first statement is false; local anesthetics become ineffective once they enter the circulatory system. The second statement is true; once in the bloodstream, local anesthetics are carried throughout the body.

   REF: p. 25

2. ANS: a
   a. Correct. Procaine, an ester local anesthetic, is the most potent vasodilator.
   b. Prilocaine does exert some vasodilating activity; however, procaine is the most potent vasodilator.
   c. Lidocaine does exert some vasodilating activity; however, procaine is the most potent vasodilator.
   d. Mepivacaine does exert some vasodilating activity; however, procaine is the most potent vasodilator.

   REF: p. 25
3. ANS: d
   a. Topical anesthetics take only 5 minutes to reach peak blood levels; rapidly achieving peak blood levels can induce a serious toxic reaction (overdose).
   b. Overdose is most likely to occur when local anesthetics are administered intravenously; peak blood levels are achieved within only 1 minute.
   c. Intramuscular injections reach peak blood levels in 5–10 minutes; subcutaneous local anesthetic is the least likely to elicit a toxic overdose.
   d. Correct. Subcutaneous injections are the least likely to elicit a toxic overdose, as it takes approximately 30–90 minutes to achieve peak blood levels.

REF: p. 26

4. ANS: d
   a. Local anesthetics are distributed via the bloodstream to the liver and absorbed by hepatic tissue; however, the highest percentage of anesthetic drug is contained within the skeletal muscle.
   b. Local anesthetics are distributed via the bloodstream to the brain and absorbed by brain tissue; however, the highest percentage of anesthetic drug is contained within the skeletal muscle.
   c. Local anesthetics are distributed via the bloodstream to the bone and absorbed by osseous tissue; however, the highest percentage of anesthetic drug is contained within the skeletal muscle.
   d. Correct. Once local anesthetics are absorbed into the bloodstream, skeletal muscle contains the largest percentage—more than any other body tissue or organ.

REF: p. 27

5. ANS: c
   a. Half-life is the rate at which a drug is eliminated or removed, not administered.
   b. Half-life is the rate at which a drug is eliminated or removed, not distributed.
   c. Correct. The rate at which a local anesthetic is removed from the bloodstream is the anesthetic’s half-life.
   d. Half-life is the rate at which a drug is eliminated or removed, not absorbed.

REF: p. 27

6. ANS: a
   a. Correct. Ester, not amide, local anesthetics are hydrolyzed in the plasma.
   b. All local anesthetics (ester and amide) cross the blood–brain barrier easily.
   c. All local anesthetics (ester and amide) cross the placenta.
   d. Patients with atypical pseudocholinesterase are unable to hydrolyze ester local anesthetics, resulting in an increased susceptibility to toxic overdose.

REF: pp. 27–28
7. **ANS: a**
   a. **Correct.** As a hybrid anesthetic, articaine has both ester and amide elements; the biotransformation of articaine occurs in the liver and the blood.
   b. The biotransformation of prilocaine occurs in the liver and the lung.
   c. Lidocaine is exclusively metabolized in the liver.
   d. Etidocaine is exclusively metabolized in the liver.

REF: p. 28

8. **ANS: a**
   a. **Correct.** The metabolism of lidocaine can facilitate an accumulation of specific by-products that produce clinical sedation.
   b. Anesthesia is the primary clinical effect of lidocaine administration.
   c. Methemoglobinemia occurs in patients when the by-products of prilocaine, not lidocaine, accumulate in the blood.
   d. Tonic–clonic seizures are a clinical manifestation of CNS toxicity.

REF: p. 29

9. **ANS: b**
   a. The uptake of local anesthesia is unaffected by renal disease or dysfunction.
   b. **Correct.** Patients with renal disease or dysfunction are unable to excrete the local anesthetic drug and its metabolites.
   c. Liver disease, or low hepatic blood flow, affects the excretion, not metabolism, of a local anesthetic.
   d. Renal disease affects the excretion, not distribution, of a local anesthetic.

REF: p. 29

10. **ANS: b**
    a. Tonic–clonic convulsions, not syncope, indicate anesthetic overdose.
    b. **Correct.** Tonic–clonic convulsion is the primary sign of toxic anesthetic levels.
    c. Tonic–clonic convulsions, not tachycardia, indicate anesthetic overdose.
    d. Tonic–clonic convulsions, not hallucination, indicate anesthetic overdose.

REF: p. 30

11. **ANS: b**
    a. The nervous system is more susceptible than the urinary system to local anesthetics.
    b. **Correct.** The CNS is decisively more vulnerable to the effects of local anesthetics than any other body system.
    c. The nervous system is more susceptible than the circulatory system to local anesthetics.
    d. The nervous system is more susceptible than the reproductive system to local anesthetics.

REF: pp. 30–31
12. ANS: d
   a. Slurred speech is caused by an anesthetic’s depressant action on the CNS.
   b. Lightheadedness is caused by an anesthetic’s depressant action on the CNS.
   c. Muscular twitching is caused by an anesthetic’s depressant action on the CNS.
   d. Correct. Bilateral tongue numbness is a preconvulsive symptom of anesthetic overdose, which is not caused by CNS depression, but rather by the direct action of the local anesthetic on the free nerve endings in the lingual tissue.

REF: p. 31

13. ANS: c
   a. An increase in arterial CO₂ results in increased seizure duration.
   b. The duration of anesthetic-related seizures increases when arterial CO₂ levels increase.
   c. Correct. The amount of local anesthetic needed to elicit a seizure is decreased when arterial CO₂ levels are increased.
   d. More local anesthetic is needed to elicit a seizure when arterial CO₂ levels decrease.

REF: p. 32

14. ANS: b
   a. Toxic levels of local anesthetic in the blood cause excitation or sedation, then seizures, generalized CNS depression, and finally respiratory arrest.
   b. Correct. Elevated blood levels of local anesthetic initially produce excitation or sedation followed by convulsions, generalized CNS depression, and eventually respiratory arrest.
   c. Toxic levels of local anesthetic in the blood cause excitation or sedation, then seizures, generalized CNS depression, and finally respiratory arrest.
   d. Toxic levels of local anesthetic in the blood cause excitation or sedation, then seizures, generalized CNS depression, and finally respiratory arrest.

REF: p. 32

15. ANS: a
   a. Correct. At preconvulsive local anesthetic blood levels, inhibitory neuron pathways are selectively depressed.
   b. Complete depression of inhibitory neuron function occurs at higher (convulsive) local anesthetic blood levels.
   c. Inhibitory, not facilitatory, neural pathways are depressed at preconvulsive local anesthetic blood levels.
   d. Anesthetic blood levels that elevate past convulsive blood levels eventually depress both inhibitory and facilitatory pathways.

REF: p. 32

16. ANS: b
   a. Hypotension, not hypertension, is the usual effect of local anesthetics on blood pressure.
   b. Correct. Administered intravenously, local anesthetics provide a degree of analgesia.
   c. Local anesthetics produce myocardial depression, not excitation.
   d. Local anesthetics administered intravenously increase, rather than decrease, the pain reaction threshold.

REF: pp. 33–34
17. ANS: b
   a. For the management of cardiac dysrhythmias, lidocaine, not articaine, is widely used.
   b. Correct. Lidocaine is the most widely used local anesthetic for the management of cardiac dysrhythmias, including premature ventricular contractions (PVCs) and ventricular tachycardia.
   c. For the management of cardiac dysrhythmias, lidocaine, not benzocaine, is widely used.
   d. For the management of cardiac dysrhythmias, lidocaine, not bupivacaine, is widely used.

   REF: p. 34

18. ANS: a
   a. Correct. The only local anesthetic drug that consistently produces vasoconstriction is cocaine.
   b. Procaine consistently produces vasodilation, not vasoconstriction.
   c. Etidocaine consistently produces vasodilation, not vasoconstriction.
   d. Mepivacaine consistently produces vasodilation, not vasoconstriction.

   REF: p. 34

19. ANS: d
   a. Profound hypotension is expected when an overdose of local anesthetic is administered.
   b. Cardiovascular collapse is expected when lethal levels of local anesthetic are administered.
   c. No negative cardiovascular effect is noted when proper therapeutic levels of local anesthetic are administered.
   d. Correct. Mild hypotension is noted when the amount of local anesthetic administered exceeds the therapeutic dose, but falls below overdose.

   REF: p. 35

20. ANS: c
   a. Skeletal muscle damage from the injection of local anesthetics is reversible, and complete regeneration occurs within approximately 14 days.
   b. Long-acting local anesthetics cause more damage to skeletal muscle than short-acting anesthetics.
   c. Correct. Skeletal muscle damage has not been linked to clinical signs of local irritation.
   d. Intraoral injections of local anesthetic can damage localized skeletal muscle.

   REF: pp. 35–36

21. ANS: b
   a. Respiratory function remains unaltered by therapeutic doses of local anesthetic.
   b. Correct. Until near-overdose levels are reached, respiratory function remains unaltered by local anesthetics.
   c. At overdose levels, respiratory function arrests completely due to CNS depression.
   d. Respiratory function remains unaltered by therapeutic doses of local anesthetic.

   REF: p. 36
22. ANS: c
   a. Prolonged muscle paralysis is not a probable outcome of dental local anesthesia.
   b. Prolonged muscle paralysis is not likely to occur from dental local anesthesia.
   c. Correct. Prolonged muscle paralysis is unlikely to occur as a result of dental local anesthesia.
   d. Prolonged muscle paralysis is an unlikely, but not entirely improbable, outcome of dental local anesthesia.

REF: p. 36

23. ANS: a
   a. Correct. Ester local anesthetics and succinylcholine both use the same metabolic pathway. As a result, prolonged apnea may occur.
   b. The interaction of ester local anesthetics with succinylcholine results in prolonged apnea, not acute tachycardia.
   c. An accelerated metabolism of the local anesthetic is expected when amide local anesthetics are administered to an individual on barbiturates.
   d. Amplified CNS depression occurs when local anesthetics are administered to an individual taking CNS depressants.

REF: p. 36

24. ANS: b
   a. Age is not linked to an acute, unpredictable response to certain drugs; malignant hyperthermia is a genetic disorder.
   b. Correct. A genetic variant is the predominant factor in malignant hyperthermia.
   c. Liver damage does not produce an acute, unpredictable response to certain drugs; malignant hyperthermia is a genetic disorder.
   d. Immunodeficiency is not linked to an acute, unpredictable response to certain drugs; malignant hyperthermia is a genetic disorder.

REF: p. 36

25. ANS: d
   a. Many anesthetic drugs trigger malignant hyperthermia, but there are no reported cases where amide local anesthetics are responsible.
   b. Many anesthetic drugs trigger malignant hyperthermia, but there are no reported cases where amide local anesthetics are responsible.
   c. Many anesthetic drugs trigger malignant hyperthermia, but there are no reported cases where amide local anesthetics are responsible.
   d. Correct. There have been no documented dental or medical cases where an amide local anesthetic triggered malignant hyperthermia.

REF: p. 36
MULTIPLE CHOICE

1. Vasodilation from injected local anesthetics leads to
   a. increased bleeding at the site of treatment.
   b. increased depth and duration of anesthesia.
   c. decreased plasma levels of the local anesthetic.
   d. decreased anesthetic absorption and redistribution.

2. Which local anesthetic ingredient acts as a vasoconstrictor?
   a. Epinephrine.
   b. Lidocaine HCl.
   c. Methylparaben.
   d. Sodium (meta)bisulfite.

3. Vasoconstrictors control tissue perfusion by which process?
   a. Decreasing cardiac output.
   b. Constricting blood vessels.
   c. Increasing the clotting ability of the blood.
   d. Disrupting calcium movement into blood vessel cells.

4. Vasoconstrictors are added to local anesthetic solutions to
   a. counteract the intrinsic vasodilation.
   b. reduce the possibility of vasculitis.
   c. boost an inherent vasoconstriction.
   d. prevent blood vessel wall collapse.

5. The effect of local anesthesia is prolonged with the addition of a vasoconstrictor because
   a. the risk of local anesthetic toxicity is reduced.
   b. bleeding is decreased at the site of administration.
   c. the local anesthetic slowly enters the circulatory system.
   d. more local anesthetic enters and inhabits the nerve for a longer duration.

6. Which catecholamine is synthetic?
   a. Dopamine.
   b. Epinephrine.
   c. Levonordefrin.
   d. Norepinephrine.
7. Beta receptors produce each of the following EXCEPT one. Which is the EXCEPTION?
   a. Vasodilation.
   b. Vasoconstriction.
   c. Increased heart rate.
   d. Stronger cardiac contractions.

8. Which best defines tachyphylaxis?
   a. Cardiac palpitations and accelerated heart rate.
   b. Genetic disorder that alters the ordinary drug response.
   c. Pharmacologic effect that mimics the response of adrenergic nerves.
   d. Declining effectiveness of a drug which has been administered repeatedly.

9. How many grams of epinephrine are contained in a solution with a 1 : 1000 dilution?
   a. 1
   b. 0.1
   c. 0.01
   d. 0.001

10. Which statement is true?
    a. Epinephrine is the most widely used vasoconstrictor in dentistry.
    b. Epinephrine is an ideal drug for medical and dental local anesthetics.
    c. A 1 : 10,000 epinephrine ratio is the most common dilution used in dentistry.
    d. Intraoral administration of epinephrine does not affect the cardiovascular system.

11. Which sign or symptom is NOT anticipated with an epinephrine reaction?
    a. Sweating.
    b. Palpitations.
    c. Bradycardia.
    d. Apprehension.

12. Norepinephrine elicits side effects
    a. three times less often than epinephrine.
    b. five times more often than epinephrine.
    c. seven times less often than epinephrine.
    d. nine times more often than epinephrine.

13. Which additive is commonly used to delay the oxidation of epinephrine?
    a. Distilled water.
    b. Methylparaben.
    c. Sodium chloride.
    d. Sodium bisulfite.

14. A local anesthetic that contains epinephrine has
    a. a longer shelf life than one that does not contain epinephrine.
    b. a shorter shelf life than one that does not contain epinephrine.
    c. an equivalent shelf life to one that does not contain epinephrine.
    d. no shelf life, and must be used immediately for clinical efficacy.
15. Epinephrine decreases which cardiovascular dynamic?
   a. Heart rate.
   b. Stroke volume.
   c. Cardiac efficiency.
   d. Systolic blood pressure.

16. Which adrenergic receptor dominates the mucous membrane blood vessels?
   a. Alpha (α).
   b. Beta 1 (β₁).
   c. Beta 2 (β₂).
   d. Beta 3 (β₃).

17. When epinephrine is used in dental surgery, postsurgical bleeding usually occurs after
   a. 1 hour.
   b. 3 hours.
   c. 6 hours.
   d. 12 hours.

18. Which describes the principal way epinephrine is eliminated from the system?
   a. Excreted in the urine.
   b. Reabsorbed by adrenergic nerves.
   c. Inactivated by monoamine oxidase (MAO).
   d. Inactivated by catechol-O-methyltransferase (COMT).

19. The maximum dose of epinephrine (1 : 100,000) for a normal healthy patient is
   a. 1 cartridge.
   b. 2 cartridges.
   c. 5.5 cartridges.
   d. 11 cartridges.

20. Compared with epinephrine, norepinephrine is
   a. one half as potent.
   b. one fourth as potent.
   c. two times more potent.
   d. three times more potent.

21. Levonordefrin is available in which dental anesthetic?
   a. Articaine.
   b. Lidocaine.
   c. Mepivacaine.
   d. Bupivacaine.

22. Which vasoconstrictor is the weakest?
   a. Epinephrine.
   b. Levonordefrin.
   c. Phenylephrine.
   d. Norepinephrine.
23. Which statement is correct?
   a. Felypressin is contraindicated for hyperthyroid patients.
   b. Felypressin directly stimulates vascular smooth muscle.
   c. Felypressin is a naturally produced antidiuretic hormone.
   d. Felypressin has a positive inotropic action on the myocardium.

24. Which occurs when a vasoconstrictor is added to most local anesthetics?
   a. The depth of hard tissue anesthesia is reduced.
   b. The duration of pulpal anesthesia is prolonged.
   c. The duration of soft tissue anesthesia is shortened.
   d. The depth and duration of hard and soft tissue anesthesia are unaffected.

25. Which vasoconstrictor is used routinely for dental surgery hemostasis?
   a. Felypressin.
   b. Epinephrine.
   c. Phenylephrine.
   d. Norepinephrine.

**Feedback**

1. ANS: a
   a. **Correct.** Vasodilation following the injection of local anesthetics leads to increased bleeding at the treatment site.
   b. The depth and duration of anesthesia is decreased, not increased, as a result of vasodilation.
   c. Plasma levels of the local anesthetic increase, rather than decrease, as a result of vasodilation.
   d. The rate of anesthetic absorption and redistribution increases, rather than decreases, as a result of vasodilation.

   REF: p. 39

2. ANS: a
   a. **Correct.** Epinephrine is a common vasoconstrictor added to local anesthetics.
   b. Lidocaine HCl is a local anesthetic drug that blocks nerve conduction.
   c. Methylparaben is a bacteriostatic agent found in local anesthetic solutions.
   d. Sodium (meta)bisulfite is an antioxidant found in local anesthetic solutions.

   REF: pp. 39, 40, 103

3. ANS: b
   a. Vasoconstrictors constrict blood vessels, rather than decrease cardiac output, to control tissue perfusion.
   b. **Correct.** Vasoconstrictors decrease tissue perfusion, or blood flow, by constricting blood vessels.
   c. Vasoconstrictors do not increase blood coagulation, but instead constrict blood vessels to control tissue perfusion.
   d. Vasoconstrictors act on the blood vessel walls, not calcium channels, to control tissue perfusion.

   REF: p. 39
4. **ANS:** a  
   a. **Correct.** Injectable local anesthetics are vasodilators, so vasoconstrictors are added to solution to counteract this intrinsic vasodilation.  
   b. Vasoconstrictors are added to local anesthetic solutions to counteract intrinsic vasodilation, not reduce vasculitis.  
   c. Vasoconstrictors are added to local anesthetic solutions to counteract intrinsic vasodilation, not boost inherent vasoconstriction.  
   d. Vasoconstrictors are added to local anesthetic solutions to counteract intrinsic vasodilation, not prevent vessel wall collapse.  

   **REF:** p. 39

5. **ANS:** d  
   a. The risk of toxicity is reduced by the addition of a vasoconstrictor; however, the reason anesthesia exhibits an increased duration is because more anesthetic enters and inhabits the nerve for a longer period of time.  
   b. Bleeding at the site of administration is decreased with the addition of a vasoconstrictor; however, the reason anesthesia exhibits an increased duration is because more anesthetic enters and inhabits the nerve for a longer period of time.  
   c. Prolonged anesthesia results when more anesthetic enters and inhabits the nerve for a longer period of time; slow uptake into the cardiovascular system results in lower anesthetic blood levels.  
   d. **Correct.** The duration of anesthesia is increased with the addition of a vasoconstrictor because more local anesthetic enters the nerve, where it stays for a longer period of time.  

   **REF:** p. 39

6. **ANS:** c  
   a. Dopamine is produced naturally in the sympathetic nervous system.  
   b. The sympathetic nervous system produces epinephrine naturally.  
   c. **Correct.** Levonordefrin is a synthetic catecholamine.  
   d. Norepinephrine is a natural product of the sympathetic nervous system.  

   **REF:** p. 39

7. **ANS:** b  
   a. Vasodilation occurs when $\beta_2$ receptors are activated.  
   b. **Correct.** Vasoconstriction occurs when $\alpha$, not $\beta$, receptors are stimulated.  
   c. Activated $\beta_2$ receptors produce increased heart rate.  
   d. Stronger cardiac contractions result when $\beta_2$ receptors are activated.  

   **REF:** p. 40

8. **ANS:** d  
   a. The epinephrine reaction causes cardiac palpitations and tachycardia.  
   b. Malignant hyperthermia is a genetic disorder that alters the ordinary drug response.  
   c. Sympathomimetic drugs mimic the response of adrenergic nerves.  
   d. **Correct.** Tachyphylaxis is the declining effectiveness of a pharmaceutical with each administration.  

   **REF:** p. 40
9. ANS: a
   a. **Correct.** In a concentration of 1 : 1000, there is 1 g of epinephrine for every 1000 mL of solution.
   b. There is 0.1 g of epinephrine in a concentration of 1 : 10,000.
   c. There is 0.01 g of epinephrine in a dilution of 1 : 100,000.
   d. There is 0.001 g of epinephrine in a dilution of 1 : 1,000,000.

REF: p. 41

10. ANS: a
    a. **Correct.** The most widely used vasoconstrictor in dental anesthetics is epinephrine.
    b. Epinephrine is not an ideal drug; risks and benefits must be examined before administration.
    c. The most common epinephrine concentration is 1 : 200,000 for dental anesthetics.
    d. The intraoral administration of epinephrine is associated with moderate cardiac output and stroke volume.

REF: pp. 41–42

11. ANS: c
    a. Sweating is a common sign of an epinephrine reaction.
    b. Cardiac palpitations are a common symptom of an epinephrine reaction.
    c. **Correct.** Tachycardia, not bradycardia, occurs when a patient experiences an epinephrine reaction.
    d. Apprehension is a common symptom of an epinephrine reaction.

REF: p. 42

12. ANS: d
    a. Norepinephrine elicits side effects nine times more often than epinephrine.
    b. Side effects are nine times more likely to occur with norepinephrine than with epinephrine.
    c. Side effects are nine times less likely to occur with epinephrine than with norepinephrine.
    d. **Correct.** The likelihood that a patient will experience side effects is nine times greater with the administration of norepinephrine than with epinephrine.

REF: p. 42

13. ANS: d
    a. Distilled water is added to the anesthetic solution to dilute the solute (drug).
    b. Methylparaben was once added as a bacteriostatic, but is no longer included in local anesthetic cartridges.
    c. Sodium chloride makes the anesthetic solution isotonic with surrounding tissues.
    d. **Correct.** Sodium bisulfite is used to postpone the oxidation of solutions that contain epinephrine.

REF: p. 42
14. **ANS:** b  
   a. Epinephrine shortens, rather than lengthens, the shelf life of a local anesthetic.  
   b. **Correct.** A local anesthetic that contains epinephrine has a shorter shelf life than one that does not.  
   c. Epinephrine truncates the shelf life of a local anesthetic solution.  
   d. Although the shelf life of a local anesthetic is shortened by the addition of epinephrine, it remains intact until about 18 months.  

   **REF:** p. 42

15. **ANS:** c  
   a. Epinephrine stimulates β receptors in the myocardium to increase the heart rate.  
   b. Epinephrine creates a positive inotropic effect on the myocardium, resulting in increased stroke volume.  
   c. **Correct.** The overall effect of epinephrine on the cardiovascular system leads to a decrease in cardiac efficiency.  
   d. Epinephrine elicits an increase in systolic blood pressure.  

   **REF:** p. 43

16. **ANS:** a  
   a. **Correct.** The blood vessels that supply the mucous membranes of the oral cavity mainly contain α receptors.  
   b. α, not β₁, receptors are found in the blood vessels of the oral mucous membranes.  
   c. α, not β₂, receptors are found in the blood vessels of the oral mucous membranes.  
   d. α, not β₃, receptors are found in the blood vessels of the oral mucous membranes.  

   **REF:** p. 43

17. **ANS:** c  
   a. Postsurgical bleeding usually occurs 6 hours, not 1, after the administration of epinephrine.  
   b. Postsurgical bleeding usually occurs 6, not 3, hours after the administration of epinephrine.  
   c. **Correct.** When epinephrine is administered with the anesthetic for hemostasis, postsurgical bleeding usually occurs 6 hours after the surgery.  
   d. Postsurgical bleeding usually occurs 6, not 12, hours after the administration of epinephrine.  

   **REF:** p. 43

18. **ANS:** b  
   a. Only 1% of epinephrine is excreted, unchanged, in the urine.  
   b. **Correct.** Epinephrine’s action is principally terminated through its reuptake by adrenergic nerves.  
   c. Adrenergic nerves reabsorb most of the epinephrine; MAO inactivates the epinephrine that escapes in the blood.  
   d. Adrenergic nerves reabsorb most of the epinephrine; COMT inactivates the epinephrine that escapes in the blood.  

   **REF:** p. 43
19. ANS: d  
   a. The maximum epinephrine dosage for a patient with significant cardiovascular disease is 1 anesthetic cartridge, if the concentration is 1:50,000.
   b. The maximum epinephrine dosage (1:100,000) for a patient with significant cardiovascular disease is 2 anesthetic cartridges.
   c. The maximum epinephrine dosage for a normal, healthy patient is 5.5 anesthetic cartridges, if the concentration is 1:50,000.
   d. Correct. The maximum epinephrine dosage (1:100,000) for a normal, healthy patient is 11 anesthetic cartridges.

REF: p. 44

20. ANS: b  
   a. Norepinephrine is four times less potent than epinephrine.
   b. Correct. Compared with epinephrine, norepinephrine is one fourth as potent.
   c. Norepinephrine is less, not more, potent than epinephrine.
   d. Norepinephrine is less, not more, potent than epinephrine.

REF: p. 45

21. ANS: c  
   a. In dental anesthetics, levonordefrin is available in mepivacaine; the vasoconstrictor available with articaine is epinephrine.
   b. Levonordefrin, in dental anesthetics, is available in mepivacaine; the vasoconstrictor with lidocaine is epinephrine.
   c. Correct. Levonordefrin is available in mepivacaine in a 1:20,000 concentration.
   d. Levonordefrin is available in mepivacaine dental cartridges; the vasoconstrictor paired with bupivacaine is epinephrine.

REF: p. 47

22. ANS: c  
   a. Phenylephrine is the weakest vasoconstrictor ever used in dentistry; epinephrine is the most potent.
   b. Levonordefrin is a stronger vasoconstrictor than phenylephrine.
   c. Correct. Phenylephrine is a weaker vasoconstrictor than epinephrine, levonordefrin, or norepinephrine.
   d. Norepinephrine is a stronger vasoconstrictor than phenylephrine.

REF: p. 47

23. ANS: b  
   a. Felypressin is safe and well tolerated by individuals with hyperthyroidism.
   c. Felypressin is a synthetic analog of vasopressin.
   d. Felypressin has no direct effect on the myocardium.

REF: p. 48
24. **ANS: b**
   a. The depth of hard tissue anesthesia is increased with the inclusion of a vasoconstrictor.
   b. **Correct.** Pulpal anesthesia is prolonged with the inclusion of a vasoconstrictor.
   c. The duration of soft tissue anesthesia is lengthened, not shortened, by the addition of a vasoconstrictor to the anesthetic solution.
   d. With the inclusion of a vasoconstrictor, the depth of hard and soft tissue anesthesia increases, and anesthetic duration is prolonged.

   **REF:** p. 48

25. **ANS: b**
   a. Felypressin provides very little hemostasis.
   b. **Correct.** Epinephrine is routinely used for dental surgery hemostasis.
   c. Phenylephrine is not available in dental anesthetic solutions.
   d. Norepinephrine is not recommended as a dental vasoconstrictor.

   **REF:** p. 49
Clinical Action of Specific Agents

Multiple Choice

1. Different individual responses to a drug are
   a. prevalent.
   b. common.
   c. uncommon.
   d. nonexistent.

2. Which local anesthetic exhibits the longest duration of action?
   a. Articaine.
   b. Lidocaine.
   c. Bupivacaine.
   d. Mepivacaine.

3. A short-acting local anesthetic provides pulpal anesthesia for approximately
   a. 15 minutes.
   b. 30 minutes.
   c. 60 minutes.
   d. 90 minutes.

4. Which is an absolute contraindication for local anesthetic use?
   a. Renal dysfunction.
   b. Cardiovascular disease.
   c. Local anesthetic allergy.
   d. Atypical plasma cholinesterase.

5. Upon administration of lidocaine 2% with epinephrine 1:100,000, a hyperresponder is likely to experience approximately how many minutes of pulpal anesthesia?
   a. 20.
   b. 40.
   c. 60.
   d. 80.

6. Which action is advised when a relative contraindication for a local anesthetic is discovered?
   a. Perform the procedure without anesthesia.
   b. Reduce the dosage of the drug in question.
   c. Use an alternative drug that is not contraindicated.
   d. Proceed with use of the drug in question until complications arise.
7. Which factor increases the duration of anesthesia?
   a. Nonvascular tissue.
   b. Dense alveolar bone.
   c. Tissue inflammation.
   d. Supraperiosteal infiltration.

8. The duration of anesthesia is decreased when less than the recommended dose of anesthetic is administered. However, excessive amounts will not increase the duration of anesthesia.
   a. Both statements are true.
   b. Both statements are false.
   c. The first statement is true; the second is false.
   d. The first statement is false; the second is true.

9. Which dose of local anesthetic should be administered to each patient?
   a. Maximum recommended dose.
   b. Largest clinically effective dose.
   c. Smallest clinically effective dose.
   d. Manufacturer's recommended dose.

10. Smaller doses of anesthetic are NOT required for which patient?
    a. Small nervous child.
    b. Elderly debilitated adult.
    c. Obese middle-aged adult.
    d. Teenage adolescent with hepatitis.

11. Which cartridge volume should be used to calculate the maximum recommended dose (MRD) of a local anesthetic?
    a. 1.7 mL.
    b. 1.76 mL.
    c. 1.8 mL.
    d. 1.86 mL.

12. Which is the most likely cause of inadequate local anesthesia?
    a. Hyperresponse.
    b. Faulty technique.
    c. Bad batch of local anesthetic.
    d. Consecutive doses within a brief time frame.

13. Which statement is true?
    a. Procaine is an amide local anesthetic.
    b. Procaine has a rapid anesthetic onset.
    c. Procaine provides no pulpal anesthesia.
    d. Procaine produces profound vasoconstriction.

14. The use of norepinephrine in dental anesthesia is associated with
    a. inadequate clinical anesthesia.
    b. slow clinical onset of anesthesia.
    c. profound vasodilation and bleeding.
    d. prolonged ischemia and tissue necrosis.
15. Which local anesthetic is most likely to elicit a true allergic reaction?
   a. Procaine.
   b. Lidocaine.
   c. Etidocaine.
   d. Mepivacaine.

16. The most widely used local anesthetic in the world today is
   a. Articaine.
   b. Lidocaine.
   c. Prilocaine.
   d. Mepivacaine.

17. Which best describes the vasodilation induced by mepivacaine?
   a. Profound.
   b. Moderate.
   c. Mild.
   d. Nonexistent.

18. Prilocaine undergoes biotransformation in each place, EXCEPT one. Which is the EXCEPTION?
   a. Liver.
   b. Lungs.
   c. Plasma.
   d. Kidneys.

19. Which nerve is usually affected when paresthesia is linked to articaine administration?
   a. Mental.
   b. Lingual.
   c. Greater palatine.
   d. Posterior alveolar.

20. Which local anesthetic is used to manage postoperative pain?
   a. Articaine.
   b. Etidocaine.
   c. Mepivacaine.
   d. Bupivacaine.

21. Topical anesthetics
   a. Penetrate intact skin.
   b. Are moderately vasoconstrictive.
   c. Are effective within 2–3 mm of the application site.
   d. Usually contain less anesthetic drug than injectable anesthetics.

22. Which benzocaine formulation is NOT recommended for intraoral use?
   a. Gel.
   b. Patch.
   c. Aerosol.
   d. Ointment.
23. The duration of topical anesthesia induced by dyclonine hydrochloride is
   a. less than 10 minutes.
   b. approximately 20 minutes.
   c. limited to 45 minutes.
   d. as long as 60 minutes.

24. Eutectic mixture of local anesthetics (EMLA) is a combination of which two drugs?
   a. Prilocaine and tetracaine.
   b. Lidocaine and prilocaine.
   c. Benzocaine and lidocaine.
   d. Tetracaine and benzocaine.

25. Phentolamine mesylate (Oraverse) serves which purpose?
   a. Reverses soft tissue anesthesia.
   b. Prolongs the duration of pulpal anesthesia.
   c. Prevents unwanted anesthesia of adjacent tissues.
   d. Increases the depth of pulpal and soft tissue anesthesia.

**Feedback**

1. ANS: b
   a. Variations in drug response are not prevalent; most patients respond predictably to a drug. Response variations are, however, common and expected.
   b. Correct. Individual response variations to a drug are normal and common.
   c. Variations in drug response are not uncommon. Although most patients respond predictably to a drug, response variations are common and expected.
   d. Although most patients respond predictably to a drug, response variations are common and expected, not nonexistent.

   REF: p. 52

2. ANS: c
   a. Articaine is classified as an intermediate-acting local anesthetic.
   b. Lidocaine is classified as an intermediate-acting local anesthetic.
   c. Correct. Bupivacaine is classified as a long-acting local anesthetic.
   d. Mepivacaine is classified as a short-acting local anesthetic, although it is considered intermediate-acting when paired with levonordefrin.

   REF: p. 53; Table 4-1

3. ANS: b
   a. The approximate duration of a short-acting anesthetic is 30, not 15, minutes.
   b. Correct. A short-acting local anesthetic provides pulpal anesthesia for approximately 30 minutes.
   c. The approximate duration of a short-acting anesthetic is 30, not 60, minutes; intermediate-acting local anesthetics last approximately 60 minutes.
   d. The approximate duration of a short-acting anesthetic is 30, not 90, minutes; long-acting local anesthetics last approximately 90 minutes.

   REF: p. 53; Box 4-1
4. ANS: c  
   a. Significant renal dysfunction presents a relative, not absolute, contraindication for local anesthetic.  
   b. Significant cardiovascular disease presents a relative, not absolute, contraindication for local anesthetic.  
   c. Correct. Local anesthetics of the same chemical class are absolutely contraindicated in the case of a documented local anesthetic allergy.  
   d. Atypical plasma cholinesterase presents a relative, not absolute, contraindication for ester local anesthetics.  

   REF: p. 53; Table 4–2

5. ANS: d  
   a. 20 minutes of pulpal anesthesia is a likely response when the patient is a hyporesponder, not a hyperresponder; 60 minutes is the expected duration of lidocaine 2% with epinephrine 1:100,000 for normo-responders.  
   b. 40 minutes of pulpal anesthesia is a likely response when the patient is a hyporesponder, not a hyperresponder; 60 minutes is the expected duration of lidocaine 2% with epinephrine 1:100,000 for normo-responders.  
   c. 60 minutes is the expected duration of lidocaine 2% with epinephrine; a hyperresponder will experience prolonged anesthesia.  
   d. Correct. The normal expected duration of lidocaine 2% with epinephrine is 60 minutes; a hyperresponder will experience prolonged anesthesia of 70 or 80 minutes, and in some cases longer.  

   REF: p. 53

6. ANS: c  
   a. When a relative contraindication to local anesthesia exists, the procedure should not be performed without anesthesia; an alternative, suitable drug should be selected.  
   b. When a relative contraindication to local anesthesia exists, the procedure should not be performed with the contraindicated drug, if at all possible. An alternative, suitable drug should be selected, instead.  
   c. Correct. In the presence of a relative contraindication, an alternative drug should be selected to achieve adequate, and safe, local anesthesia.  
   d. When a relative contraindication to local anesthesia exists, the procedure must not carry on until complications arise; rather, an alternative, suitable drug should be selected.  

   REF: p. 73

7. ANS: a  
   a. Correct. Anesthetic duration is greater in nonvascular or less vascular regions, than in highly vascular regions.  
   b. Anesthetic duration is decreased, not increased, in areas of dense alveolar bone.  
   c. Anesthetic duration is decreased, not increased, in areas of tissue inflammation.  
   d. Anesthetic duration is decreased, not increased, by the administration of a supraperiosteal infiltration, instead of a nerve block.  

   REF: p. 54
8. **ANS:** a
   a. **Correct.** Both statements are true. Although inadequate doses of anesthetic solution shorten the duration of anesthesia, excessive doses of anesthetic do NOT increase anesthetic duration.
   b. Both statements are true; inadequate doses of anesthetic solution shorten the duration of anesthesia, but excessive doses do NOT lengthen it.
   c. The second statement is true; excessive doses of anesthetic solution do not lengthen anesthetic duration.
   d. The first statement is true; inadequate doses of anesthetic solution shorten the duration of anesthesia.

 **REF:** p. 54

9. **ANS:** c
   a. The maximum recommended dose limits the amount of anesthetic to prevent drug overdose, but all patients should receive the smallest clinically effective dose, despite the maximum recommended dose.
   b. The smallest, not largest, clinically effective dose should always be administered, for patient safety.
   c. **Correct.** Administering the smallest clinically effective dose enhances patient safety.
   d. The smallest clinically effective dose should always be administered, for patient safety, despite the manufacturer’s recommended dose.

 **REF:** p. 55

10. **ANS:** c
    a. Smaller doses of anesthetic should be administered to a small nervous child; small, lightweight patients are at an increased risk for anesthetic overdose.
    b. Smaller doses of anesthetic should be administered to an elderly debilitated adult; small, lightweight patients are at an increased risk for anesthetic overdose.
    c. **Correct.** The recommended anesthetic dose does not require adjustment for obesity, but should be decreased for smaller, light weight patients, or those with “at risk” conditions, such as liver dysfunction.
    d. Smaller doses of anesthetic should be administered to patients with decreased liver function.

 **REF:** p. 55

11. **ANS:** c
    a. Dental cartridges are filled mechanically, and vary slightly in volume from one cartridge to another. Cartridge volume is needed to calculate a patient’s MRD; 1.8 mL per cartridge should be used.
    b. The average anesthetic cartridge volume in the United States is 1.76 mL, but cartridge volumes vary; 1.8 mL per cartridge is the recommended volume to be used when calculating MRD.
    c. **Correct.** When calculating the MRD of local anesthetic for a patient, the cartridge volume of 1.8 mL should be used.
    d. Cartridge volume is needed to calculate a patient’s MRD; 1.8 mL per cartridge should be used, not 1.86 mL.

 **REF:** p. 56
12. **ANS:** b  
   a. Faulty technique is the most likely cause of inadequate pain control; hyperresponders generally experience an early onset of profound anesthesia.  
   b. **Correct.** Faulty technique and anatomic variation are the most likely causes for inadequate pain control, following the administration of local anesthetic.  
   c. Distribution of faulty anesthetic solution is very unlikely; incorrect technique is the most likely cause of inadequate pain control.  
   d. Incorrect technique is the most likely cause of inadequate pain control. Anesthetic overdose is more likely when consecutive injections are administered within a brief time frame.

   **REF:** p. 57

13. **ANS:** c  
   a. Procaine is an ester, not amide, local anesthetic.  
   b. Procaine has a very slow onset of action, nearly 6–10 minutes.  
   c. **Correct.** Procaine provides no pulpal anesthesia, and only 15–30 minutes of soft tissue anesthesia.  
   d. Procaine produces profound vasodilation, not vasoconstriction.

   **REF:** p. 57

14. **ANS:** d  
   a. Norepinephrine is linked to prolonged ischemia and tissue necrosis, not inadequate anesthesia.  
   b. Norepinephrine is linked to prolonged ischemia and tissue necrosis, not slow anesthesia onset.  
   c. Norepinephrine is linked to prolonged ischemia and tissue necrosis, not vasodilation and bleeding.  
   d. **Correct.** Norepinephrine is linked to prolonged ischemia and tissue necrosis.

   **REF:** p. 58

15. **ANS:** a  
   a. **Correct.** Allergies to ester local anesthetics, such as procaine, develop much more often than allergies to amide local anesthetics.  
   b. Lidocaine is an amide local anesthetic; allergies are essentially nonexistent.  
   c. Etidocaine is an amide local anesthetic; allergies are essentially nonexistent.  
   d. Mepivacaine is an amide local anesthetic; allergies are essentially nonexistent.

   **REF:** p. 57

16. **ANS:** b  
   a. Lidocaine, not articaine, is the most widely used local anesthetic.  
   b. **Correct.** Lidocaine is the most widely used, medical or dental, local anesthetic in the world today.  
   c. Lidocaine, not prilocaine, is the most widely used local anesthetic.  
   d. Lidocaine, not mepivacaine, is the most widely used local anesthetic.

   **REF:** p. 58
17. **ANS: c**
   a. Mepivacaine produces a mild, rather than profound, vasodilating effect.
   b. Mepivacaine produces a mild, rather than moderate, vasodilating effect.
   c. **Correct.** Mepivacaine produces a notably mild vasodilating effect.
   d. Mepivacaine produces a mild vasodilating effect.

   **REF:** p. 61

18. **ANS: c**
   a. The biotransformation of prilocaine does NOT take place in the plasma, but rather in the liver, kidneys, and lungs.
   b. The biotransformation of prilocaine does NOT take place in the plasma, but rather in the liver, kidneys, and lungs.
   c. **Correct.** Prilocaine undergoes biotransformation in the liver, lungs, and kidneys, while articaine undergoes biotransformation in the plasma and liver.
   d. The biotransformation of prilocaine does NOT take place in the plasma, but rather in the liver, kidneys, and lungs.

   **REF:** p. 63

19. **ANS: b**
   a. The lingual, not mental, nerve is usually affected when paresthesia is linked to articaine use.
   b. **Correct.** The majority of paresthesia cases, linked to the administration of articaine, involve the lingual nerve.
   c. The lingual, not greater palatine, nerve is usually affected when paresthesia is linked to articaine use.
   d. The lingual, not posterior alveolar, nerve is usually affected when paresthesia is linked to articaine use.

   **REF:** p. 66

20. **ANS: d**
   a. Bupivacaine, not articaine, provides effective postoperative pain management.
   b. Bupivacaine, not etidocaine, provides effective postoperative pain management.
   c. Bupivacaine, not mepivacaine, provides effective postoperative pain management.
   d. **Correct.** Bupivacaine provides effective postoperative pain management for endodontic, periodontal, postimplant, and other surgical procedures.

   **REF:** p. 68

21. **ANS: c**
   a. Topical anesthetics cannot penetrate intact skin, but diffuse readily through mucous membranes and abraded skin.
   b. Topical anesthetics have no vasoconstrictive properties or additives.
   c. **Correct.** Topical anesthetics penetrate only the surface tissues within 2–3 mm of the application site.
   d. Topical anesthetics contain more anesthetic drug than their injectable counterparts.

   **REF:** p. 69
22. ANS: c
   a. Benzocaine gel is an effective and safe topical anesthetic; aerosol sprays are contraindicated for the delivery of oral topical anesthesia.
   b. A benzocaine patch is an effective and safe delivery for topical anesthesia; aerosol sprays are contraindicated for the delivery of oral topical anesthesia.
   c. Correct. Benzocaine aerosol spray is contraindicated for intraoral use; sprays are difficult to confine, and impossible to measure.
   d. Benzocaine ointment is an effective and safe delivery for topical anesthesia; aerosol sprays are contraindicated for the delivery of oral topical anesthesia.

REF: p. 69

23. ANS: d
   a. Dyclonine hydrochloride produces topical anesthesia for up to 60, not 10, minutes.
   b. Dyclonine hydrochloride produces topical anesthesia for up to 60, not 20, minutes.
   c. Dyclonine hydrochloride produces topical anesthesia for up to 60, not 45, minutes.
   d. Correct. The anesthesia produced by dyclonine hydrochloride lasts as long as 60 minutes.

REF: p. 70

24. ANS: b
   a. EMLA is a mixture of prilocaine and lidocaine, not tetracaine.
   b. Correct. EMLA is a 1:1 combination of lidocaine 2.5% and prilocaine 2.5%.
   c. EMLA is a mixture of lidocaine and prilocaine, not benzocaine.
   d. EMLA is a mixture of lidocaine and prilocaine, not tetracaine and benzocaine.

REF: p. 71

25. ANS: a
   a. Correct. Phentolamine mesylate is a local anesthesia reversal agent used to reverse soft tissue anesthesia at the completion of a procedure.
   b. Phentolamine mesylate is not used to prolong pulpal anesthesia, but rather to reverse soft tissue anesthesia.
   c. Phentolamine mesylate is not used to prevent unwanted anesthesia, but rather to reverse soft tissue anesthesia.
   d. Phentolamine mesylate is not used to increase the depth of anesthesia, but rather to reverse soft tissue anesthesia.

REF: p. 72
MULTIPLE CHOICE

1. The American Dental Association (ADA) has established each criterion for the dental syringe, EXCEPT one. Which is the EXCEPTION?
   a. Durable.
   b. Lightweight.
   c. Inexpensive.
   d. Nonaspirating.

2. Which type of syringe is used most frequently in dentistry?
   a. Needleless jet injector.
   b. Disposable, plastic, dental safety.
   c. Breech-loading, metallic, cartridge-type, aspirating.
   d. Computer-controlled local anesthetic delivery system.

3. A reusable plastic aspirating syringe provides which advantage over a similar metal syringe?
   a. Low cost.
   b. Rust resistance.
   c. Cartridge visibility.
   d. One-handed aspiration.

4. Compared to harpoon-aspirating syringes, self-aspirating syringes provide
   a. a less reliable aspiration.
   b. a more reliable aspiration.
   c. an equally reliable aspiration.
   d. an aspiration of unknown reliability.

5. Each, EXCEPT one, is an advantage of the pressure syringe. Which is the EXCEPTION?
   a. Delivers a measured dose of local anesthetic.
   b. Facilitates rapid injection of anesthetic solution.
   c. Simplifies the administration of a periodontal ligament (PDL) injection.
   d. Protects the patient from an unexpected cartridge break.

6. The primary purpose of the jet injector is to provide
   a. regional block anesthesia.
   b. localized anesthesia in periodontal pockets.
   c. topical anesthesia before the insertion of a needle.
   d. pulpal anesthesia of one isolated mandibular tooth.
7. Which statement is correct?
   b. Plastic disposable syringes are ideal for routine intraoral use.
   c. Aspirations cannot be accomplished with a plastic disposable syringe.
   d. A 28-gauge needle is recommended when using a disposable syringe for dental anesthesia.

8. At the completion of an injection, a safety syringe is
   a. discarded in a sharps container.
   b. dissembled, cleaned, and autoclaved.
   c. disengaged and reloaded with a second cartridge.
   d. dismantled from the sheathed needle and sterilized.

9. Compared with the standard manual syringe, computer-controlled local anesthetic delivery is
   a. much less painful.
   b. slightly less painful.
   c. slightly more painful.
   d. much more painful.

10. The STA (Single Tooth Anesthesia) System presents a unique approach to which injection?
    a. Nasopalatine (NP).
    b. Inferior alveolar (IA).
    c. Periodontal ligament (PDL).
    d. Posterior superior alveolar (PSA).

11. The STA Wand handpiece is durably designed for multiple-use sterilization, and can be adjusted to various lengths for versatility.
    a. Both statements are true.
    b. Both statements are false.
    c. The first statement is true; the second is false.
    d. The first statement is false; the second is true.

12. The Comfort Control Syringe (CCS)
    a. requires specialty dental needles.
    b. costs less than other computer-controlled local anesthetic delivery systems (C-CLADs).
    c. has a three-stage delivery system.
    d. uses a foot control for anesthetic delivery.

13. Reusable metal and plastic syringes should be lubricated at which interval?
    a. After every autoclaving.
    b. After every other autoclaving.
    c. After every five autoclavings.
    d. After every 10 autoclavings.

14. An off-centered puncture in the diaphragm of an anesthetic cartridge leads to
    a. a bent harpoon.
    b. a broken cartridge.
    c. leakage during injection.
    d. harpoon disengagement.
15. Which is least likely to cause a broken anesthetic cartridge?
   a. Dull harpoon.
   b. Bent harpoon.
   c. Badly worn syringe.
   d. Needle bent at proximal end.

16. Which operator error causes harpoon disengagement?
   a. Too little negative pressure applied during aspiration.
   b. Too much negative pressure applied during aspiration.
   c. Too little positive pressure applied during anesthetic deposition.
   d. Too much positive pressure applied during anesthetic deposition.

17. Which motion produces a successful aspiration?
   a. Firm forward motion of the plunger.
   b. Gentle forward motion of the plunger.
   c. Firm backward motion of the plunger.
   d. Gentle backward motion of the plunger.

18. Which dental needle is associated with harpoon disengagement?
   a. 23 gauge.
   b. 25 gauge.
   c. 27 gauge.
   d. 30 gauge.

19. Which statement is true?
   a. Ultrasonic cleaning will harm metallic syringes.
   b. All reusable syringes must be able to withstand sterilization.
   c. A self-aspirating syringe is an ideal choice for individuals with large hands.
   d. Syringes manufactured by Septodont Inc. are superior in quality and performance.

20. The needle adaptor is a
   a. metal ring.
   b. strong metal rod.
   c. removable screw hub.
   d. sharp, hook-shaped tip.

21. The operator applies pressure to which syringe component to deliver anesthetic?
   a. Finger grip.
   b. Thumb ring.
   c. Syringe barrel.
   d. Needle adaptor.

22. The ability to aspirate blood is largely influenced by the
   a. gauge of the needle.
   b. patient’s blood type.
   c. weight of the syringe.
   d. type of local anesthetic.
23. Tactile sensation is minimized with which syringe?
   a. Wand.
   b. Safety.
   c. Metallic.
   d. Disposable.

24. Self-aspirating syringes rely on which element to function?
   a. Mechanical pressure.
   b. Dynamic pressure-sensing technology.
   c. Rubber diaphragm in the anesthetic cartridge.
   d. Silicone rubber stopper in the anesthetic cartridge.

25. The greatest disadvantage of the pressure syringe is
   a. cost.
   b. appearance.
   c. tissue damage.
   d. difficult aspiration.

Feedback

1. ANS: d
   a. Dental anesthetic syringes should be durable, according to the ADA.
   b. Dental anesthetic syringes should be lightweight, according to the ADA.
   c. Dental anesthetic syringes should be inexpensive, according to the ADA.
   d. Correct. All dental anesthetic syringes should be capable of easily observed aspiration; nonaspirating syringes fall below the current standard of care.
   REF: p. 78

2. ANS: c
   a. Needleless jet injector syringes are used less frequently in dentistry than breech-loading, metallic, cartridge-type syringes.
   b. Disposable, plastic, dental safety syringes are used less frequently in dentistry than breech-loading, metallic, cartridge-type syringes.
   c. Correct. The nondisposable, breech-loading, metallic, cartridge-type of aspirating syringe is the most commonly used syringe in dentistry.
   d. Computer-controlled local anesthetic delivery systems are used less frequently in dentistry than breech-loading, metallic, cartridge-type syringes.
   REF: p. 78

3. ANS: a
   a. Correct. Plastic, reusable, aspirating syringes cost less than similar metallic syringes.
   b. Both plastic and metallic reusable aspirating syringes are rust resistant.
   c. Both plastic and metallic reusable aspirating syringes make the cartridge visible.
   d. Both plastic and metallic reusable aspirating syringes facilitate one-handed aspiration.
   REF: p. 79; Box 5-2, Box 5-3
4. ANS: c
a. Aspirations of self-aspirating syringes are not less reliable than those of harpoon-aspirating syringes.
b. Aspirations of self-aspirating syringes are not more reliable, but equally reliable to those of harpoon-aspirating syringes.
c. **Correct.** Self-aspirating syringes provide an equally reliable aspiration to that of harpoon-aspirating syringes.
d. Self-aspirating syringes have been shown to produce aspirations of equal reliability to those produced by harpoon-aspirating syringes.

REF: p. 80

5. ANS: b
a. The pressure syringe delivers a measured dose of local anesthetic as one of its many advantages.
b. **Correct.** Rapid injection of anesthetic solution is a painful disadvantage associated with the pressure syringe.
c. The pressure syringe simplifies the administration of the PDL injection as one of its many advantages.
d. The pressure syringe protects the patient from an unexpected cartridge break as one of its many advantages.

REF: p. 81

6. ANS: c
a. The jet injector is used primarily for topical anesthesia; regional block anesthesia requires a traditional local anesthetic injection.
b. The jet injector is used primarily for topical anesthesia before an injection, or for mucosal anesthesia of the palate, not periodontal pockets.
c. **Correct.** The jet injector primarily provides topical anesthesia before the insertion of a needle.
d. The jet injector is used primarily for topical anesthesia; the pressure syringe is used for pulpal anesthesia of one isolated mandibular tooth.

REF: p. 82

7. ANS: a
a. **Correct.** Dental cartridges are not compatible with plastic disposable syringes.
b. Plastic disposable syringes are not recommended for routine intraoral use.
c. Aspirations are accomplished with a plastic disposable syringe; however, they require a two-handed approach.
d. A 25- or 27-gauge needle is best for administering intraoral anesthesia with a plastic disposable syringe.

REF: pp. 82–83
8. ANS: a  
   a. Correct. A safety syringe is intended for single use; at the completion of an injection, the syringe is discarded in a sharps container.  
   b. Safety syringes are not designed for multiple-use, but should be properly discarded in a sharps container at the completion of an injection.  
   c. Reloading a safety syringe is discouraged; at the completion of an injection, the safety syringe should be discarded in a sharps container.  
   d. The safety syringe should not be dismantled, but placed in the sharps container, at the completion of an injection.  

REF: p. 83

9. ANS: a  
   a. Correct. Overall pain perception is significantly reduced with the C-CLAD system, compared with injections administered with a standard manual syringe.  
   b. Overall pain perception is significantly, not slightly, reduced with the C-CLAD system.  
   c. Overall pain perception is significantly reduced, not slightly increased, with the C-CLAD system.  
   d. Overall pain perception is significantly reduced, not increased, with the C-CLAD system.  

REF: pp. 84–85

10. ANS: c  
    a. The STA System will facilitate a standard NP injection, but presents a unique approach to the PDL injection using dynamic pressure-sensing technology.  
    b. The STA System will facilitate a standard IA injection, but presents a unique approach to the PDL injection using dynamic pressure-sensing technology.  
    c. Correct. The STA System is programmed to audibly and visually guide the operator into the periodontal ligament space, a unique approach to the PDL injection.  
    d. The STA System will facilitate a standard PSA injection, but presents a unique approach to the PDL injection using dynamic pressure-sensing technology.  

REF: p. 86

11. ANS: d  
    a. The first statement is false. The STA Wand handpiece is disposable and designed for single-use, per patient visit.  
    b. The second statement is true. The STA Wand handpiece is adjustable to various lengths for greater versatility.  
    c. The first statement is false; the second is true. The STA Wand handpiece is designed for single-use, and can be adjusted to various lengths for versatility.  
    d. Correct. The first statement is false; the second is true. The STA Wand handpiece is designed for single-use, not multiple-use. The handpiece can be adjusted to various lengths.  

REF: p. 87
12. ANS: b  
   a. The CCS uses standard, not specialty, dental needles.  
   b. Correct. The CCS System costs less than other C-CLADs.  
   c. The CCS has a two, not three, stage delivery system.  
   d. The CCS uses a handpiece control, instead of a foot control, for anesthetic delivery.

   REF: pp. 88–89; Box 5-10

13. ANS: c  
   a. To properly maintain a reusable syringe, light lubrication is recommended after every five autoclavings.  
   b. To properly maintain a reusable syringe, light lubrication is recommended after every five autoclavings.  
   c. Correct. To properly maintain a reusable syringe, light lubrication is recommended after every five autoclavings.  
   d. To properly maintain a reusable syringe, light lubrication is recommended after every five, not 10, autoclavings.

   REF: p. 89

14. ANS: c  
   a. Off-centered perforation of the cartridge diaphragm leads to anesthetic leakage, not a bent harpoon.  
   b. Off-centered perforation of the cartridge diaphragm leads to anesthetic leakage, not a broken cartridge.  
   c. Correct. Off-centered perforation of the cartridge diaphragm leads to anesthetic leakage.  
   d. Off-centered perforation of the cartridge diaphragm leads to anesthetic leakage, not harpoon disengagement.

   REF: p. 89

15. ANS: a  
   a. Correct. A dull harpoon is apt to produce disengagement during aspiration, but a broken cartridge is unlikely.  
   b. A bent harpoon leads to cartridge breakage.  
   c. A badly worn syringe may damage and break the anesthetic cartridge.  
   d. Pressure applied to the cartridge, when the proximal end of the needle is bent, causes pressure to increase from within to break the cartridge.

   REF: p. 89

16. ANS: b  
   a. Inadequate negative pressure applied during aspiration will not disengage the harpoon; excessive pressure will.  
   b. Correct. Excessive negative pressure applied to the thumb ring during aspiration can cause the harpoon to disengage from the silicone rubber plunger.  
   c. Excessive negative pressure, not inadequate positive pressure, causes harpoon disengagement.  
   d. Excessive negative, not positive, pressure causes harpoon disengagement.

   REF: p. 90
17. ANS: d
   a. A gentle backward, not firm forward, motion will elicit a fine aspiration.
   b. A gentle backward, not forward, motion will elicit a fine aspiration.
   c. A gentle, not firm, backward motion will elicit a fine aspiration; firm pressure is unwarranted and may disengage the harpoon.
   d. Correct. A gentle backward motion of the plunger is all that is required to produce a successful aspiration.

   REF: p. 90

18. ANS: d
   a. Disengagement is most likely to occur when a 30-, not 23-, gauge needle is used.
   b. Disengagement is most likely to occur when a 30-, not 25-, gauge needle is used.
   c. Disengagement is most likely to occur when a 30-, not 27-, gauge needle is used.
   d. Correct. During aspiration, resistance from within the lumen of a 30-gauge needle increases the likelihood of harpoon disengagement.

   REF: p. 90

19. ANS: b
   a. Ultrasonic cleaning will not harm metallic syringes.
   b. Correct. All reusable syringes must be able to withstand sterilization.
   c. Self-aspirating syringes are recommended for individuals with small hands.
   d. No manufacturer’s syringe is superior to any other.

   REF: p. 90

20. ANS: c
   a. The thumb ring, not needle adaptor, is a metal ring attached to the piston.
   b. The piston, not needle adaptor, is a strong metal rod that penetrates and moves the rubber stopper.
   c. Correct. The needle adaptor is a removable screw hub that attaches the needle to the syringe.
   d. The harpoon, not needle adaptor, is a sharp, hook-shaped tip at the end of the piston.

   REF: pp. 78–79

21. ANS: b
   a. The thumb ring gives the operator control over anesthetic delivery; the finger grip provides stability in handling.
   b. Correct. Pressure applied to the thumb ring controls the delivery of local anesthetic.
   c. Pressure is applied to the thumb ring, not syringe barrel, to deliver local anesthetic.
   d. Pressure applied to the thumb ring, not needle adaptor, controls the delivery of local anesthetic.

   REF: p. 78
22. ANS: a
   a. **Correct.** The gauge of the needle affects the ability to aspirate successfully.
   b. The ability to aspirate blood is largely influenced by the gauge of the needle, not the patient’s blood type.
   c. The ability to aspirate blood is largely influenced by the gauge of the needle, not the weight of the syringe.
   d. The ability to aspirate blood is largely influenced by the gauge of the needle, not the type of local anesthetic.

REF: p. 80

23. ANS: c
   a. The Wand is lightweight, maximizing tactile sensitivity.
   b. Safety syringes are lightweight, maximizing tactile sensitivity.
   c. **Correct.** The weight of a metallic syringe minimizes tactile sensitivity.
   d. Disposable syringes are lightweight, maximizing tactile sensitivity.

REF: p. 79, Box 5-2; p. 83, Box 5-7, Box 5-8

24. ANS: c
   a. Self-aspirating syringes use the rubber diaphragm in the anesthetic cartridge, not mechanical pressure.
   b. Self-aspirating syringes use the rubber diaphragm in the anesthetic cartridge, not dynamic pressure-sensing technology.
   c. **Correct.** Self-aspirating syringes use the rubber diaphragm in the anesthetic cartridge to elicit multiple aspirations during the delivery of local anesthetic.
   d. Self-aspirating syringes use the rubber diaphragm in the anesthetic cartridge, not the rubber stopper.

REF: p. 80

25. ANS: a
   a. **Correct.** Cost is a prohibitive disadvantage associated with the pressure syringe.
   b. First generation pressure syringes had an intimidating appearance, but modern-day versions are smaller and less concerning; the greatest disadvantage is cost.
   c. Tissue damage is linked to the jet injector, rather than the pressure syringe.
   d. Difficult aspiration is a disadvantage of the disposable, not pressure, syringe.

REF: p. 81
The Needle

Multiple Choice

1. Dental anesthetic needles are made of
   a. copper.
   b. titanium.
   c. stainless steel.
   d. chrome-plated brass.

2. Which creates the tip of the needle?
   a. Hub.
   b. Shaft.
   c. Bevel.
   d. Lumen.

3. Which two factors are of paramount importance when selecting a needle?
   a. Bevel and gauge.
   b. Gauge and length.
   c. Hub type and bevel.
   d. Length and hub type.

4. Which needle has the smallest lumen?
   a. 23-gauge.
   b. 25-gauge.
   c. 27-gauge.
   d. 30-gauge.

5. A rising trend in dentistry favors large-diameter needles, because these needles are less traumatic to the patient.
   a. Both statements are true.
   b. Both statements are false.
   c. The first statement is true; the second is false.
   d. The first statement is false; the second is true.

6. Which is associated with a larger-gauged needle?
   a. Less accuracy.
   b. Easier aspiration.
   c. Greater deflection.
   d. Frequent needle breakage.
7. Modern disposable dental needles break at which frequency?
   a. Often.
   b. Occasionally.
   c. Rarely.
   d. Never.

8. The most reliable aspiration is likely to come from which needle?
   a. 25-gauge.
   b. 26-gauge.
   c. 27-gauge.
   d. 30-gauge.

9. The risk of which complication is increased by the use of a 30-gauge needle?
   a. Broken cartridge.
   b. Pain on insertion.
   c. Harpoon disengagement.
   d. Leakage during injection.

10. The tip of a nondeflecting needle is located
    a. in the center of the shaft.
    b. at the lower edge of the shaft.
    c. at the upper edge of the shaft.
    d. slightly below the center of the shaft.

11. In each injection, EXCEPT one, the risk of positive aspiration warrants the use of a larger-gauged needle. Which is the EXCEPTION?
    a. Mental.
    b. Nasopalatine.
    c. Inferior alveolar.
    d. Posterior superior alveolar.

12. Which needle is recommended for shallow injections in less vascular tissue?
    a. 23-gauge.
    b. 25-gauge.
    c. 27-gauge.
    d. 30-gauge.

13. The bi-rotational insertion technique practically eliminates
    a. needle barbs.
    b. penetration pain.
    c. needle deflection.
    d. lingual paresthesia.

14. Needle deflection is the result of pressure applied to the
    a. hub.
    b. shaft.
    c. bevel.
    d. adaptor.
15. The conventional needle insertion technique is called
   a. linear insertion.
   b. quiver insertion.
   c. angular insertion.
   d. rotational insertion.

16. Which statement is correct?
   a. The smaller the gauge of the needle, the less exaggerated the deflection.
   b. The longer the length of the needle, the greater the degree of deflection.
   c. Rotating the needle during penetration and advancement increases deflection.
   d. Pressure on a downward-facing bevel causes the needle to deflect downward.

17. Dental needles are available in each length, EXCEPT one. Which is the EXCEPTION?
   a. Long.
   b. Short.
   c. Medium.
   d. Ultrashort.

18. Needle length is measured from
   a. tip to hub.
   b. bevel heel to hub.
   c. tip to cartridge penetration end.
   d. bevel heel to cartridge penetration end.

19. Which is the standard length of a long dental needle?
   a. 20 mm.
   b. 25 mm.
   c. 30 mm.
   d. 32 mm.

20. Needle breakage occurs at the weakest point, which is where?
   a. Tip.
   b. Hub.
   c. Syringe adaptor.
   d. Shaft mid-section.

21. Needles should be changed after how many insertions?
   a. One or two.
   b. Three or four.
   c. Five or six.
   d. Seven or more.

22. Which local anesthetic needle can perform every dental injection?
   a. 25-gauge short.
   b. 25-gauge long.
   c. 27-gauge short.
   d. 27-gauge long.
23. Each action, EXCEPT one, is associated with needle breakage. Which is the EXCEPTION?
   a. Redirecting an embedded needle.
   b. Forcing the needle against resistance.
   c. Bending the needle to administer a nerve block.
   d. Using the same needle for several consecutive injections.

24. Which is the most common origin of needle barbs?
   a. Defective manufacturing process.
   b. Needle is wiped on unsterile gauze before insertion.
   c. Tip forcefully contacts bone during needle advancement.
   d. Direction of the needle is inadvertently changed while in the tissue.

25. A barbed anesthetic needle is identified by pain on
   a. insertion.
   b. deposition.
   c. withdrawal.
   d. advancement.

**Feedback**

1. ANS: c
   a. Dental anesthetic needles are stainless steel, not copper.
   b. Dental anesthetic needles are stainless steel, not titanium.
   c. Correct. Dental anesthetic needles are made of stainless steel.
   d. Dental anesthetic needles are stainless steel, not chrome-plated brass.

   REF: p. 92

2. ANS: c
   a. The bevel creates the needle tip; the hub connects the needle to the syringe adaptor.
   b. The bevel creates the needle tip; the shaft is the long tubular body of the needle.
   c. Correct. The bevel creates the tip or point of the needle.
   d. The bevel creates the needle tip; the lumen is the interior diameter of the needle.

   REF: p. 92

3. ANS: b
   a. Gauge and length are essential to selecting the best needle for various injections; bevel angle is less important.
   b. Correct. Gauge and length are of paramount importance to selecting the best needle for various injection techniques.
   c. Gauge and length are essential to selecting the best needle for various injections; bevel angle is less important, and hub type is inconsequential.
   d. Gauge and length are essential to selecting the best needle for various injections; hub type is inconsequential.

   REF: p. 92
4. ANS: d  
   a. The larger the number, the smaller the lumen. A 23-gauge needle has the largest, not smallest, lumen.  
   b. The larger the number, the smaller the lumen. A 30-gauge needle has a smaller lumen than a 25-gauge needle.  
   c. The larger the number, the smaller the lumen. A 30-gauge needle has a smaller lumen than a 27-gauge needle.  
   d. Correct. A 30-gauge needle has the smallest lumen: the larger the number, the smaller the lumen.  

REF: p. 92

5. ANS: b  
   a. Both statements are false, not true. Small-diameter needles are a rising trend, despite the fact that needle gauge is indistinguishable to the patient.  
   b. Correct. Both statements are false. The rising trend in dentistry favors small-, rather than large-, diameter needles. However, patients cannot differentiate between various needle gauges.  
   c. The first statement is false. Small-, not large-, diameter needles are a rising trend.  
   d. The second statement is false. Needle gauge is indistinguishable to the patient.  

REF: p. 92

6. ANS: b  
   a. Larger-gauged needles are prone to less deflection, thereby improving accuracy.  
   b. Correct. Resistance to aspiration is reduced with a larger-gauged needle.  
   c. Larger-gauged needles are prone to less deflection, thereby improving accuracy.  
   d. Larger-gauged needles are less likely to break than smaller-gauged needles.  

REF: pp. 93–94; Box 6-1

7. ANS: c  
   a. In present-day dentistry, disposable anesthetic needles rarely break.  
   b. Needle breakage is a rare, not occasional, occurrence in modern dentistry.  
   c. Correct. Disposable anesthetic needles rarely break in present-day dentistry.  
   d. Needle breakage is a rare, but possible, occurrence in modern dentistry.  

REF: p. 93

8. ANS: a  
   a. Correct. Aspiration is more reliable through a larger lumen; a 25-gauge needle has the largest lumen and is apt to produce the most reliable aspiration.  
   b. The most reliable aspiration is likely to come from a larger-gauged needle; a 25-gauge needle is more reliable than a 26-gauge.  
   c. The most reliable aspiration is likely to come from a larger-gauged needle; a 25-gauge needle is more reliable than a 27-gauge.  
   d. The most reliable aspiration is likely to come from a larger-gauged needle; a 25-gauge needle is more reliable than a 30-gauge.  

REF: p. 93
9. ANS: c
   a. The likelihood of harpoon disengagement, not cartridge breakage, is increased with a 30-gauge needle.
   b. The likelihood of harpoon disengagement is increased with a 30-gauge needle; pain on insertion is not.
   c. Correct. Harpoon disengagement is more likely with a 30-gauge needle.
   d. The likelihood of harpoon disengagement is increased with a 30-gauge needle; leakage during injection is not.

REF: p. 93

10. ANS: a
    a. Correct. The tip of a nondeflecting needle is aligned with the center of the shaft.
    b. The tip of a conventional dental needle is aligned with the lower edge of the shaft; a nondeflecting needle is aligned with the center of the shaft.
    c. The tip of a nondeflecting needle is aligned with the center, not the upper edge, of the shaft.
    d. The tip of a nondeflecting needle is aligned with the center of the shaft, not below it.

REF: p. 94; Figure 6-4

11. ANS: b
    a. A larger-gauged needle should be used for the mental injection due to the high incidence of positive aspiration.
    b. Correct. The nasopalatine injection does NOT require significant soft tissue penetration through highly vascular tissue.
    c. A larger-gauged needle should be used for the inferior alveolar injection, because the technique requires significant soft tissue penetration through highly vascular tissue.
    d. A larger-gauged needle should be used for the posterior superior alveolar injection, because the technique requires significant soft tissue penetration through highly vascular tissue.

REF: p. 95

12. ANS: c
    a. A 23-gauge needle is not used or recommended in dentistry.
    b. A 25-gauge needle is recommended for injections in highly vascular tissue and/or when the penetration depth is substantial.
    c. Correct. A 27-gauge needle is recommended for all intraoral injections where the risk of positive aspiration is low and the penetration depth is shallow.
    d. A 30-gauge needle is not specifically recommended for any intraoral injection.

REF: p. 95
13. **ANS: c**
   a. The bi-rotational insertion technique eliminates needle deflection, not barbs.
   b. The bi-rotational insertion technique eliminates needle deflection, not penetration pain.
   c. **Correct.** Needle deflection is practically eliminated with the bi-rotational insertion technique.
   d. The bi-rotational insertion technique eliminates needle deflection, not lingual paresthesia.

   REF: p. 95

14. **ANS: c**
   a. Pressure applied to the bevel, not hub, of the needle results in deflection.
   b. Pressure applied to the bevel of the needle during tissue penetration and advancement causes needle deflection.
   c. **Correct.** Pressure applied to the bevel of the needle results in deflection.
   d. Pressure applied to the needle bevel, not syringe adaptor, results in deflection.

   REF: p. 95

15. **ANS: a**
   a. **Correct.** Linear insertion is the conventional technique for traditional local anesthetic administration, using a standard dental syringe.
   b. The conventional technique for needle insertion is called linear insertion, not quiver insertion.
   c. The conventional technique for needle insertion is called linear insertion, not angular insertion.
   d. Rotational insertion is a new approach to anesthetic administration that requires a pen-like handpiece; conventional needle insertion is called linear insertion.

   REF: p. 95

16. **ANS: b**
   a. Deflection is more, not less, exaggerated with a smaller-gauged needle.
   b. **Correct.** The amount of deflection increases with the length of the needle.
   c. Rotating the needle during penetration and advancement decreases, not increases, deflection.
   d. Pressure on a downward-facing bevel will cause deflection in the opposite direction, or upward, not downward.

   REF: pp. 95–96

17. **ANS: c**
   a. Long dental needles are readily available; medium-length needles are not.
   b. Short dental needles are readily available; medium-length needles are not.
   c. **Correct.** Dental needles come in three lengths: ultrashort, short, and long; medium-length needles are not available.
   d. Ultrashort dental needles are readily available; medium-length needles are not.

   REF: p. 96
18. ANS: a
   a. Correct. The needle length is measured in millimeters, from the needle tip to the hub.
   b. Needle length is measured from the needle tip, not bevel heel, to the hub.
   c. Needle length is measured from the needle tip to the hub, not cartridge penetration end.
   d. Needle length is measured from the needle tip to the hub, rather than the bevel heel to cartridge penetration end.

   REF: p. 96

19. ANS: d
   a. A standard long dental needle is approximately 32, not 20, mm.
   b. A standard long dental needle is approximately 32, not 25, mm.
   c. A standard long dental needle is approximately 32, not 30, mm.
   d. Correct. The standard length of a long dental needle is approximately 32 mm.

   REF: p. 96

20. ANS: b
   a. Needle breakage occurs at the weakest point: the needle hub, not tip.
   b. Correct. The weakest point is where needle breakage occurs—the needle hub.
   c. Needle breakage occurs at the weakest point: the needle hub, not the syringe adaptor.
   d. Needle breakage occurs at the weakest point: the needle hub, not the mid-section of the shaft.

   REF: p. 97

21. ANS: b
   a. Modern dental needles remain sharp for one or two insertions on the same patient, but the needle should be changed if more than three or four insertions are required.
   b. Correct. Needles become dull after three or four insertions on the same patient, and should be changed to maximize patient comfort.
   c. Using the same needle for five or six insertions will inflict unnecessary pain; needles become dull after three or four insertions and should be changed to maximize patient comfort.
   d. Using the same needle for seven or more insertions will inflict unnecessary pain; needles become dull after three or four insertions and should be changed to maximize patient comfort.

   REF: p. 97
22. ANS: b
   a. The 25-gauge short needle is too short to safely complete every dental injection; the 25-gauge long needle is long enough, rigid, and provides reliable aspiration.
   b. **Correct.** The 25-gauge long needle is long enough and rigid enough to safely complete every dental injection, with accurate and reliable aspiration.
   c. The 27-gauge short needle is too short, and has too narrow a diameter to safely complete every dental injection; the 25-gauge long needle is long enough, rigid, and provides reliable aspiration in highly vascular tissue.
   d. The 27-gauge long needle has too narrow a diameter to safely complete every dental injection; the 25-gauge long needle is long enough, rigid, and provides reliable aspiration in highly vascular tissue.

REF: p. 97

23. ANS: d
   a. Redirecting an embedded needle can cause the needle to break.
   b. Forcing the needle against resistance can cause the needle to break.
   c. Bending the needle to administer a nerve block can cause the needle to break.
   d. **Correct.** A needle used for several consecutive injections is apt to elicit increasing pain with each insertion, but needle breakage is unlikely.

REF: p. 98

24. ANS: c
   a. Although a defective manufacturing process can produce needle barbs, the most common origin is forceful contact with bone during needle advancement.
   b. Contaminating the needle tip before insertion is strongly discouraged, but will not produce needle barbs.
   c. **Correct.** Needle barbs are usually the product of forceful contact with bone during needle advancement.
   d. Redirecting the needle within the tissue is strongly discouraged but, unless forceful contact is made with bone, will not produce needle barbs.

REF: p. 99

25. ANS: c
   a. Needle barbs are usually acquired after insertion, when the needle tip hits bone forcefully. Pain is experienced as the needle is drawn back through the tissue, on withdrawal.
   b. Needle barbs are usually acquired after insertion, when the needle tip hits bone forcefully. Pain is experienced as the needle is drawn back through the tissue on withdrawal, not during anesthetic deposition.
   c. **Correct.** A barbed needle is identified by pain experienced as the needle is withdrawn.
   d. Needle barbs are usually acquired after insertion, when the needle tip hits bone forcefully. Pain is experienced as the needle is drawn back through the tissue on withdrawal, not during initial needle advancement.

REF: p. 99
CHAPTER 7

The Cartridge

Multiple Choice

1. In dentistry, the anesthetic cartridge is commonly called a/an
   a. tubule.
   b. ampule.
   c. carpule.
   d. capsule.

2. Plastic cartridges retain which feature?
   a. Shorter shelf-life.
   b. Impermeability to air.
   c. Decreased tendency to leak.
   d. Smooth plunger movement.

3. The syringe harpoon engages with which cartridge component?
   a. Cap.
   b. Tube.
   c. Stopper.
   d. Diaphragm.

4. Current-day cartridge stoppers are treated with
   a. latex.
   b. silicone.
   c. glycerin.
   d. paraffin.

5. Which dental cartridge is safe for use?
   a. Stopper is perfectly flush with the lip of the glass cylinder.
   b. Stopper is slightly indented from the lip of the glass cylinder.
   c. Stopper is slightly extruded from the lip of the glass cylinder.
   d. Stopper is indented 4–5 mm from the lip of the glass cylinder.

6. The needle penetrates the cartridge through the
   a. stopper.
   b. diaphragm.
   c. aluminum cap.
   d. cylindrical tube.
7. The cartridge label does NOT
   a. provide information about the anesthetic drug.
   b. disclose the volume of the anesthetic cartridge.
   c. wrap around the neck of the cartridge to hold the diaphragm in place.
   d. minimize harm to the clinician and patient in the event of a broken cartridge.

8. A red color-coded band identifies what anesthetic drug, according to the American Dental Association Council on Scientific Affairs?
   a. Articaine HCl 4% with epinephrine 1 : 100,000.
   b. Bupivacaine 0.5% with epinephrine 1 : 200,000.
   c. Lidocaine HCl 2% with epinephrine 1 : 100,000.
   d. Prilocaine HCl 4% with epinephrine 1 : 200,000.

9. Administering local anesthetic via a glass cartridge may
   a. prevent acute anaphylaxis in patients with latex allergy.
   b. precipitate acute anaphylaxis in patients with latex allergy.
   c. decrease the risk of allergic reaction in patients with latex allergy.
   d. increase the risk of allergic reaction in patients with latex allergy.

10. The volume of an anesthetic cartridge is composed primarily of which?
    a. Sterile water.
    b. Methylparaben.
    c. Sodium chloride.
    d. Sodium (meta)bisulfite.

11. Which is NOT found in single-use dental cartridges?
    a. Levonordefrin.
    b. Methylparaben.
    c. Sodium chloride.
    d. Sodium (meta)bisulfate.

12. How much anesthetic drug is contained in a 1.8 mL cartridge of lidocaine HCl 2%?
    a. 9 mg.
    b. 18 mg.
    c. 36 mg.
    d. 54 mg.

13. The dental cartridge should be sterilized before use. Local anesthetic drugs remain stable when autoclaved or boiled.
    a. Both statements are true.
    b. Both statements are false.
    c. The first statement is true; the second is false.
    d. The first statement is false; the second is true.

14. Compared with vasopressor-containing anesthetics, plain local anesthetics
    a. are safer.
    b. last longer.
    c. are less painful.
    d. have a slower clinical onset.
15. Administration of an old or expired dental cartridge is linked to which?
   a. Edema.
   b. Pruritus.
   c. Burning.
   d. Paresthesia.

16. Each blister pack typically contains how many dental cartridges?
   a. 10.
   b. 25.
   c. 50.
   d. 75.

17. Which is the BEST place to store anesthetic cartridges?
   a. Refrigerator.
   b. Clear dispenser.
   c. Cartridge warmer.
   d. Drawer or cupboard.

18. Cartridge warmers are
   a. necessary.
   b. recommended.
   c. helpful.
   d. problematic.

19. A large bubble in the anesthetic cartridge is caused by
   a. boiling the cartridge.
   b. freezing the cartridge.
   c. exposing the cartridge to direct sunlight.
   d. submerging the cartridge in disinfecting solution.

20. Which anesthetic solution does NOT produce an intense burning sensation on injection?
   a. Plain.
   b. Expired.
   c. Overheated.
   d. Contaminated.

21. In modern dentistry, a sticky stopper occurs
   a. frequently.
   b. regularly.
   c. occasionally.
   d. rarely.

22. A dental cartridge with a corroded aluminum cap has been
   a. autoclaved.
   b. immersed in cold sterile.
   c. wiped with rubbing alcohol.
   d. shipped in a vacuum-sealed tin container.
23. Which action is recommended when rust is discovered on an anesthetic cartridge?
   a. Dispose of the cartridge; do not use.
   b. Remove rust with rubbing alcohol before use.
   c. Soak cartridge in cold sterile and air-dry before use.
   d. Use cartridge as usual; rust will not affect the procedure.

24. Which is the most common cause of cartridge breakage?
   a. Using a syringe with a bent harpoon.
   b. Using a cartridge that was damaged in shipment.
   c. Attempting to use a cartridge with an extruded stopper.
   d. Applying excessive force when engaging the syringe harpoon.

25. Which statement is true?
   a. Plastic cartridges extend the shelf-life of the anesthetic.
   b. Plastic cartridges are prone to fracture during PDL injections.
   c. Anesthetic leakage occurs more frequently with plastic cartridges.
   d. Using a plastic cartridge eliminates the likelihood of a sticky stopper.

Feedback

1. ANS: c
   a. Carpule, not tubule, is the common dental reference to an anesthetic cartridge.
   b. Carpule, not ampule, is the common dental reference to an anesthetic cartridge.
   c. Correct. Cartridges are often referred to as carpules in the dental field.
   d. Carpule, not capsule, is the common dental reference to an anesthetic cartridge.

   REF: p. 101

2. ANS: a
   a. Correct. Plastic cartridges have a shorter shelf-life than glass cartridges, due to the permeability of the plastic.
   b. Plastic cartridges are permeable, a feature that reduces the shelf-life.
   c. Plastic cartridges are apt to leak when firm pressure is applied to the plunger.
   d. Plastic cartridges exhibit an erratic plunger movement; the plunger smoothly glides down a glass cartridge.

   REF: p. 101

3. ANS: c
   a. The harpoon engages with the stopper, not the aluminum cap.
   b. The harpoon engages with the stopper, not the cylindrical glass tube.
   c. Correct. The cartridge stopper engages with the syringe harpoon.
   d. The harpoon engages with the stopper, not the diaphragm.

   REF: p. 101
4. **ANS: b**  
   a. Cartridge stoppers are treated with silicone, not latex.  
   b. **Correct.** Cartridge stoppers today are treated with silicone.  
   c. Cartridge stoppers today are treated with silicone, not glycerin.  
   d. Cartridge stoppers today are treated with silicone, not paraffin.  

   REF: p. 101  

5. **ANS: b**  
   a. The stopper of an intact cartridge is slightly indented. A dental cartridge stopper that is perfectly flush with the lip of the glass cylinder marks an unsafe cartridge.  
   b. **Correct.** The stopper of an intact dental cartridge is slightly indented from the lip of the glass cylinder.  
   c. The stopper of an intact cartridge is slightly indented. A dental cartridge stopper that is slightly extruded marks an unsafe cartridge.  
   d. The stopper of an intact cartridge is slightly indented. A dental cartridge stopper that is significantly indented marks an unsafe cartridge.  

   REF: p. 101  

6. **ANS: b**  
   a. The needle penetrates the cartridge through the diaphragm, not the stopper.  
   b. **Correct.** The needle penetrates the cartridge through the diaphragm.  
   c. The needle penetrates the cartridge through the diaphragm, not the cap.  
   d. The needle penetrates the cartridge through the diaphragm, not the glass tube.  

   REF: p. 101  

7. **ANS: c**  
   a. The cartridge label provides information about the anesthetic drug.  
   b. The cartridge label discloses the volume of the cartridge, sometimes with printed incremental indicators.  
   c. **Correct.** The aluminum cap holds the diaphragm in place, as opposed to the cartridge label.  
   d. The cartridge label minimizes harm to the clinician and patient when a glass cartridge breaks or cracks.  

   REF: p. 102  

8. **ANS: c**  
   a. A gold, not red, color-coded band identifies articaine HCl 4% with epinephrine 1 : 100,000.  
   b. A blue, not red, color-coded band identifies bupivacaine 0.5% with epinephrine 1 : 200,000.  
   c. **Correct.** Lidocaine HCl 2% with epinephrine 1 : 100,000 is identified by a red color-coded band.  
   d. A yellow, not red, color-coded band identifies prilocaine HCl 4% with epinephrine 1 : 200,000.  

   REF: p. 102; Table 7-1
9. ANS: d
   a. Anaphylaxis is not prevented by the use of glass cartridges; in fact, those with latex allergies may be at an increased risk of allergic reaction when the anesthetic is administered through a glass cartridge.
   b. Administering local anesthetic with a glass cartridge has never precipitated a documented acute anaphylactic reaction; however, the risk of an allergic reaction is increased with the use of a glass cartridge.
   c. The risk of an allergic reaction is increased, not decreased, when a glass cartridge is used to administer local anesthetic to those with latex allergies.
   d. Correct. Although there are no documented cases of allergic reactions from anesthetic cartridges made of glass, these cartridges may increase the risk of allergic reaction in patients with latex allergy.

REF: p. 102

10. ANS: a
    a. Correct. Sterile water contributes volume to the anesthetic solution.
    b. Methylparaben is a very small percentage of the overall volume of an anesthetic cartridge, which is composed primarily of sterile water.
    c. Sodium chloride is a very small percentage of the overall volume of an anesthetic cartridge, which is composed primarily of sterile water.
    d. Sodium (meta)bisulfate is a very small percentage of the overall volume of an anesthetic cartridge, which is composed primarily of sterile water.

REF: p. 103; Table 7-2

11. ANS: b
    a. Levonordefrin is a vasopressor added to single-use dental cartridges to increase the depth and duration of anesthesia.
    b. Correct. Methylparaben is no longer a constituent in single-use dental cartridges.
    c. Sodium chloride is added to single-use dental cartridges to facilitate isotonicity.
    d. Sodium (meta)bisulfite is used as an antioxidant in single-use dental cartridges.

REF: p. 103; Table 7-2

12. ANS: c
    a. A 1.8 mL cartridge of lidocaine 2% contains 36, not 9, mg of local anesthetic drug.
    b. A 1.8 mL cartridge of lidocaine 2% contains 36, not 18, mg of local anesthetic drug.
    c. Correct. 36 mg of lidocaine are contained within a 1.8 mL cartridge of lidocaine 2%.
    d. A 1.8 mL cartridge of lidocaine 2% contains 36, not 54, mg of local anesthetic drug.

REF: p. 103
13. **ANS: d**
   a. The first statement is false. Anesthetic cartridges do not require sterilization prior to use.
   b. The second statement is true. Although autoclaving or boiling an anesthetic cartridge will destroy heat-sensitive vasopressors and cartridge seals, the actual local anesthetic drug remains stable when autoclaved or boiled.
   c. The first statement is false, not true. The second statement is true, not false.
   d. **Correct.** The first statement is false; there is no reason to sterilize an anesthetic cartridge before use. The second statement is true; local anesthetic drugs do not break down when autoclaved or boiled.

   REF: pp. 103–104

14. **ANS: c**
   a. Vasopressors enhance the safety of local anesthetics.
   b. Vasopressors extend the anesthetic action.
   c. **Correct.** Plain local anesthetics are more comfortable to receive than those containing vasopressors.
   d. Vasopressors slow the onset of local anesthesia.

   REF: p. 104

15. **ANS: c**
   a. Edema is linked to excessive levels of sodium chloride in the anesthetic solution.
   b. Pruritus (itching sensation) is linked to allergic reactions to paraben.
   c. **Correct.** The pH of an anesthetic cartridge drops as it ages, producing an increased burning sensation upon administration.
   d. Paresthesia is linked to excessive levels of sodium chloride in the anesthetic solution.

   REF: p. 104

16. **ANS: a**
   a. **Correct.** 10 anesthetic cartridges are typically sealed in each blister pack.
   b. Each blister pack usually holds 10, not 25, dental cartridges.
   c. Local anesthetics are packaged in a vacuum-sealed tin or cardboard box in quantities of 50; however, within the box or tin, the cartridges are sealed in blister packs of 10.
   d. Each blister pack usually holds 10, not 75, dental cartridges.

   REF: p. 104

17. **ANS: d**
   a. Cartridges stored in the refrigerator are exposed to temperatures below 21°C; anesthetic cartridges are best stored at room temperature.
   b. Cartridges stored in a clear cartridge dispenser are exposed to light; anesthetic cartridges are best stored in a dark place.
   c. Cartridges stored in a cartridge warmer are exposed to temperatures above 22°C; anesthetic cartridges are best stored at room temperature.
   d. **Correct.** The best place to store anesthetic cartridges is in the original blister pack at room temperature in a dark place, like a clean drawer or cupboard.

   REF: p. 104
18. ANS: d
   a. Cartridge warmers do not represent the current standard of care; to the contrary, they are unnecessary and problematic.
   b. Cartridge warmers are not recommended; to the contrary, they are unnecessary and problematic.
   c. Cartridge warmers are not helpful, but rather unnecessary and problematic.
   d. Correct. Cartridge warmers are unnecessary and problematic.

REF: p. 104

19. ANS: b
   a. Freezing, rather than boiling, the cartridge produces a large bubble and an extruded stopper.
   b. Correct. Freezing the cartridge produces a large bubble when thawed.
   c. Exposing the cartridge to direct sunlight reduces the duration of the anesthetic; freezing the cartridge produces a large bubble.
   d. Submerging the cartridge in disinfecting solution will produce an extruded stopper with no bubble; freezing the cartridge produces a large bubble.

REF: p. 105

20. ANS: a
   a. Correct. Plain anesthetic solutions do not produce an intense burning sensation on injection; however, those with a vasopressor may.
   b. Expired anesthetic elicits an intense burning sensation on injection.
   c. Overheated anesthetic cartridges elicit an intense burning sensation on injection.
   d. Contaminated anesthetic elicits an intense burning sensation on injection.

REF: p. 107

21. ANS: d
   a. A sticky stopper is a rare, rather than frequent, occurrence in dentistry today.
   b. A sticky stopper is a rare, rather than regular, occurrence in dentistry today.
   c. A sticky stopper is a rare, rather than occasional, occurrence in dentistry today.
   d. Correct. With the advent of silicon-coated stoppers, a sticky plunger rarely occurs today.

REF: p. 107

22. ANS: b
   a. Autoclaving a glass cartridge will destroy the cartridge seals, but is not linked to cap corrosion.
   b. Correct. Corrosion results when quaternary ammonium salts found in cold sterile solutions react with the aluminum cartridge cap.
   c. Cartridges sealed with an aluminum cap can be safely wiped with 91% isopropyl alcohol or 70% ethyl alcohol.
   d. Occasionally, a cartridge will leak during shipment, which may produce rust on the cartridge cap. Corrosion is a product of cartridge immersion in cold sterile.

REF: p. 107
23. ANS: a
   a. Correct. Rusty cartridges are not safe to administer, and must be disposed of.
   b. Although the rust can be removed, rusty cartridges are not safe and should be properly disposed of.
   c. Cartridges should never be submerged in cold sterile; rusty cartridges are not safe for administration and should be properly disposed of.
   d. Rusty cartridges are not safe to administer, and must be disposed of.

   REF: p. 107

24. ANS: b
   a. Using a syringe with a bent harpoon can lead to cartridge breakage, but in most cases in which a cartridge breaks during use, the cartridge was cracked or chipped during shipment.
   b. Correct. In most cases where a cartridge breaks during use, the cartridge was cracked or chipped during shipment.
   c. Attempting to use a cartridge with an extruded stopper can lead to cartridge breakage, but the most common cause is using a cartridge that was damaged in shipment.
   d. Applying excessive force when engaging the syringe harpoon can lead to cartridge breakage, but the most common cause is using a cartridge that was damaged in shipment.

   REF: p. 108

25. ANS: c
   a. Cartridges made of plastic have a shorter shelf-life than those made of glass because plastic is permeable to air.
   b. Plastic cartridges do not fracture under PDL injection pressures.
   c. Correct. Plastic cartridges are more apt to leak under considerable pressure.
   d. Sticky stoppers are associated with the use of plastic, rather than glass, cartridges.

   REF: p. 108
Multiple Choice

1. Topical antiseptic
   a. interrupts the nerve impulse.
   b. facilitates atraumatic needle penetration.
   c. enhances the duration and depth of local anesthesia.
   d. reduces the bacterial population at the injection site.

2. Topical antiseptic is applied for which length of time?
   a. 5–10 seconds.
   b. 15–30 seconds.
   c. 1–2 minutes.
   d. 3–4 minutes.

3. Which allergy is a relevant topical antiseptic precaution?
   a. Ester.
   b. Iodine.
   c. Paraben.
   d. Bisulfate.

4. Applying topical antiseptic before an intraoral injection is an optional step. In fact, most dentists do not use topical antiseptics to prepare the injection site.
   a. Both statements are true.
   b. Both statements are false.
   c. The first statement is true; the second is false.
   d. The first statement is false; the second is true.

5. Applying a topical anesthetic for 2–3 minutes produces
   a. no soft tissue analgesia.
   b. little soft tissue analgesia.
   c. adequate soft tissue analgesia.
   d. profound soft tissue analgesia.

6. Which statement is true?
   a. Most topical anesthetics contain the amide lidocaine.
   b. Allergic reactions to benzocaine are usually limited to the application site.
   c. The risk of overdose is greater with ester topical anesthetics than with amides.
   d. EMLA (eutectic mixture of local anesthetics) is designed for safe intraoral use.
7. Which topical anesthetic is most dangerous?
   a. Gel.
   b. Paste.
   c. Spray.
   d. Ointment.

8. Applicator sticks are
   a. flat orangewood sticks, rounded at each end.
   b. small plastic sticks with a tiny sponge at each end.
   c. long wooden sticks with a cotton swab at one end.
   d. short plastic sticks packaged with a precoated sponge of topical anesthetic.

9. In addition to applying topical anesthetic, applicator sticks are also used to
   a. depress the tongue.
   b. remove gross debris.
   c. dry mucous membrane.
   d. compress palatal tissue.

10. Compared with topical antiseptic, sterile cotton gauze prepares the injection site
    a. more effectively.
    b. equally well.
    c. less effectively.
    d. very poorly.

11. Drying the mucous membrane assists which effort?
    a. Improving visibility.
    b. Providing compression anesthesia.
    c. Reducing the risk of anesthetic overdose.
    d. Facilitating a rapid onset of topical anesthesia.

12. Which size of cotton gauze is recommended for tissue retraction?
    a. 1 inch.
    b. 2 inch.
    c. 3 inch.
    d. 4 inch.

13. A long strand of dental floss is tied around the cotton gauze before leaving it in the mouth,
    because dry cotton gauze makes the tissues easier to grasp.
    a. The statement is correct, but the reason is not.
    b. The statement is not correct, but the reason is correct.
    c. Both the statement and the reason are correct and related.
    d. Both the statement and the reason are correct but not related.

14. The hemostat is used primarily for which complication?
    a. Bent harpoon.
    b. Broken needle.
    c. Sticky stopper.
    d. Leaking cartridge.
15. Each is an essential component of the local anesthetic armamentarium, EXCEPT one. Which is the EXCEPTION?
   a. Needle.
   b. Syringe.
   c. Cartridge.
   d. Hemostat.

16. Dental antiseptics should NOT contain which ingredient?
   a. Iodine.
   b. Xylitol.
   c. Alcohol.
   d. Thimerosal.

17. Regular use of topical antiseptic practically eliminates
   a. paresthesia.
   b. hematomas.
   c. postinjection infections.
   d. painful needle penetration.

18. Which quantity of topical anesthetic gel is needed for maximum results?
   a. Large.
   b. Ample.
   c. Modest.
   d. Minimal.

19. Which topical anesthetic factor controls the depth of soft tissue analgesia?
   a. Type.
   b. Form.
   c. Duration.
   d. Quantity.

20. Which amide is safe for oral topical administration?
   a. Lidocaine.
   b. Articaine.
   c. Bupivacaine.
   d. Mepivacaine.

21. EMLA (eutectic mixture of local anesthetics) is a blend of which two anesthetics?
   a. Lidocaine and prilocaine.
   b. Benzocaine and lidocaine.
   c. Prilocaine and mepivacaine.
   d. Mepivacaine and benzocaine.

22. Which taste is associated with EMLA (eutectic mixture of local anesthetics)?
   a. Sour.
   b. Salty.
   c. Bitter.
   d. Sweet.
23. Xylocaine spray delivers which metered dose?
   a. 5 mg.
   b. 10 mg.
   c. 20 mg.
   d. 40 mg.

24. Which is recommended to keep an anesthetic spray nozzle sterile?
   a. Use a new can of anesthetic spray for each patient.
   b. Cover the spray nozzle with disposable plastic film.
   c. Use a new disposable applicator nozzle with each patient.
   d. Remove the nozzle and soak it in cold sterile solution between patients.

25. 4 inch cotton gauze squares are best used to
   a. stop intraoral bleeding.
   b. cleanse the injection site.
   c. retract the lips and cheeks.
   d. dry the mucous membrane.

**Feedback**

1. ANS: d
   a. A local anesthetic drug, not topical antiseptic, interrupts the nerve impulse.
   b. Topical anesthetic, not antiseptic, facilitates atraumatic needle penetration.
   c. Vasopressors enhance the duration and depth of local anesthesia; topical antiseptic is an antibacterial.
   d. Correct. Topical antiseptic is used to reduce the bacterial population at the injection site, thereby preventing infection.

   REF: p. 110

2. ANS: b
   a. 15–30 seconds is the recommended application time for topical antiseptic.
   b. Correct. Topical antiseptic is applied for 15–30 seconds.
   c. 15–30 seconds is sufficient for the application of topical antiseptic.
   d. 15–30 seconds is sufficient for the application of topical antiseptic.

   REF: p. 110

3. ANS: b
   a. Ester anesthetics are not found in topical antiseptics, iodine is.
   b. Correct. Iodine allergies are common and contraindicate the administration of iodine-containing antiseptics, like Betadine.
   c. Paraben is not found in topical antiseptics, iodine is.
   d. Bisulfate is not found in topical antiseptics, iodine is.

   REF: p. 110
4. ANS: a
   a. Correct. Both statements are true. Topical antiseptics are an optional step; most dentists do not use topical antiseptics in practice.
   b. Both statements are true, not false.
   c. The second statement is true. Most dentists never use topical antiseptics to prepare an injection site.
   d. The first statement is true. Applying topical antiseptic is considered an optional step in preparing the injection site.

   REF: p. 110

5. ANS: d
   a. When applied for 10–15 seconds, as recommended by the manufacturer, topical anesthetic has no clinical effect beyond that of a placebo.
   b. After 2–3 minutes of contact, topical anesthetic will produce profound soft tissue analgesia.
   c. After 2–3 minutes of contact, topical anesthetic will produce profound soft tissue analgesia.
   d. Correct. Profound soft tissue analgesia is produced when topical anesthetic is applied for 2–3 minutes.

   REF: p. 110

6. ANS: b
   a. Most topical anesthetics contain the ester benzocaine, not the amide lidocaine.
   b. Correct. Benzocaine is not readily absorbed into the cardiovascular system, so allergic reactions are usually limited to the application site.
   c. The risk of overdose is greater with amide topical anesthetics than with esters.
   d. EMLA is designed to provide topical anesthesia of intact skin, not oral mucosa.

   REF: p. 110

7. ANS: c
   a. Overdose is a possibility with topical anesthetic gel, but anesthetic sprays are more dangerous because measured doses are more difficult to administer.
   b. Overdose is a possibility with topical anesthetic paste, but anesthetic sprays are more dangerous because measured doses are more difficult to administer.
   c. Correct. Anesthetic sprays are capable of delivering dangerously high doses of topical anesthetic; anesthetic gels, pastes, and ointments are safer options.
   d. Overdose is a possibility with topical anesthetic ointment, but anesthetic sprays are more dangerous because measured doses are more difficult to administer.

   REF: p. 111

8. ANS: c
   a. Applicator sticks have a cotton swab, as opposed to a flat round tip, at one end.
   b. Applicator sticks are usually made of wood, as opposed to plastic, and have a cotton swab, not a tiny sponge, at one end.
   c. Correct. Applicator sticks are long wooden sticks with a cotton swab at one end.
   d. Applicator sticks are usually made of wood, as opposed to plastic, and have a cotton swab, not a precoated sponge, at one end.

   REF: p. 111
9. ANS: d
   a. Tongue depressors, not applicator sticks, are used to depress the tongue.
   b. Sterile cotton gauze is used to remove gross debris, prior to injection, not applicator sticks.
   c. Sterile cotton gauze is used to dry mucous membrane, not applicator sticks.
   d. Correct. Applicator sticks are used to compress tissue during palatal injections.

REF: p. 111

10. ANS: c
    a. Sterile cotton gauze is less, not more, effective in preparing the injection site.
    b. Sterile cotton gauze is less, not equally, effective in preparing the injection site.
    c. Correct. Sterile cotton gauze can adequately prepare the injection site, but it does so less effectively than topical antiseptic.
    d. Sterile cotton gauze prepares the injection site acceptably, but less effectively than topical antiseptic.

REF: p. 111

11. ANS: a
    a. Correct. Drying the oral mucosa improves soft tissue retraction and visibility of the injection site.
    b. Compression anesthesia is not reliant upon dry mucous membrane.
    c. Drying the mucous membrane does not reduce the risk of anesthetic overdose.
    d. Drying the mucous membrane does not speed the onset of topical anesthesia.

REF: p. 111

12. ANS: b
    a. Different sizes of cotton gauze can be used for tissue retraction, but the 2 × 2 inch size is recommended as practical and most commonly used.
    b. Correct. 2 × 2 inch cotton gauze is the most practical for tissue retraction.
    c. Different sizes of cotton gauze can be used for tissue retraction, but the 2 × 2 inch size is recommended as practical and most commonly used.
    d. Correct. 2 × 2 inch cotton gauze is the most practical for tissue retraction.

REF: p. 111

13. ANS: d
    a. The statement and the reason are correct but not related.
    b. The statement and the reason are correct but not related.
    c. The statement and the reason are correct but not related.
    d. Correct. Both the statement and the reason are correct but not related. Dry cotton gauze makes the tissues easier to grasp. However, a long strand of dental floss is tied around the gauze before leaving it in the mouth because gauze may require quick removal.

REF: p. 111
14. ANS: b
   a. The hemostat is not used to correct a bent harpoon, but rather to remove a broken needle from the soft tissues.
   b. Correct. The hemostat is included in the local anesthetic armamentarium for needle removal, should a needle break in the tissue.
   c. The hemostat is not used to correct a sticky stopper, but rather to remove a broken needle from the soft tissues.
   d. The hemostat is not used to correct a leaking cartridge, but rather to remove a broken needle from the soft tissues.

REF: pp. 111–112

15. ANS: d
   a. The dental needle is a major component of the local anesthetic armamentarium; the hemostat is important, but not essential.
   b. The dental syringe is a major component of the local anesthetic armamentarium; the hemostat is important, but not essential.
   c. The dental cartridge is a major component of the local anesthetic armamentarium; the hemostat is important, but not essential.
   d. Correct. A hemostat is not an essential component of the local anesthetic armamentarium.

REF: p. 111

16. ANS: c
   a. Iodine is an acceptable antiseptic ingredient, although caution must be taken to ensure that the patient does not have an allergy to iodine, before use.
   b. Xylitol is an acceptable flavoring ingredient used in dental antiseptics.
   c. Correct. Alcohol-containing antiseptics should not be used intraorally.
   d. Thimerosal is an acceptable antibacterial agent used in dental antiseptics.

REF: p. 110

17. ANS: c
   a. Postinjection infections, not paresthesia, can be prevented by regularly applying topical antiseptic.
   b. Postinjection infections, not hematomas, can be prevented by regularly applying topical antiseptic.
   c. Correct. Regular use of topical antiseptic practically eliminates postinjection infections.
   d. Applying topical antiseptic prevents postinjection infections, not painful needle penetration.

REF: p. 110
18. ANS: d  
a. A minimal, not large, quantity of topical anesthetic gel is recommended for maximum results.  
b. A minimal, not ample, quantity of topical anesthetic gel is recommended for maximum results.  
c. A minimal, not modest, quantity of topical anesthetic gel is recommended for maximum results.  
d. **Correct.** A minimal quantity of topical anesthetic will produce maximum results.

REF: p. 110

19. ANS: c  
a. The type of topical anesthetic used has no bearing on the depth of soft tissue analgesia; however, the duration of application does.  
b. The form of topical anesthetic used has no bearing on the depth of soft tissue analgesia; however, the duration of application does.  
c. **Correct.** The depth of soft tissue analgesia is determined by the length or duration of topical anesthetic applications.  
d. The quantity of topical anesthetic used has no bearing on the depth of soft tissue analgesia; however, the duration of application does.

REF: p. 110

20. ANS: a  
a. **Correct.** Lidocaine is the only amide that is safe for oral topical administration.  
b. Articaine is not administered topically; lidocaine is the only safe and effective amide topical anesthetic.  
c. Bupivacaine is not administered topically; lidocaine is the only safe and effective amide topical anesthetic.  
d. Mepivacaine is not administered topically; lidocaine is the only safe and effective amide topical anesthetic.

REF: p. 110

21. ANS: a  
a. **Correct.** EMLA is a blend of lidocaine and prilocaine, used to anesthetize intact skin.  
b. EMLA is a blend of lidocaine and prilocaine, not benzocaine.  
c. EMLA is a blend of prilocaine and lidocaine, not mepivacaine.  
d. EMLA is a blend of lidocaine and prilocaine, not mepivacaine and benzocaine.

REF: p. 110

22. ANS: c  
a. EMLA is bitter, not sour, tasting.  
b. EMLA is bitter, not salty, tasting.  
c. **Correct.** EMLA is designed for dermal use—it contains no flavoring and tastes bitter.  
d. EMLA is bitter, not sweet, tasting.

REF: p. 111
23. ANS: b
   a. A fixed dose of 10, not 5, mg of local anesthetic is administered each time the metered Xylocaine spray nozzle is depressed.
   b. Correct. Xylocaine spray delivers a fixed dose of 10 mg per metered spray.
   c. A fixed dose of 10, not 20, mg of local anesthetic is administered each time the metered Xylocaine spray nozzle is depressed.
   d. A fixed dose of 10, not 40, mg of local anesthetic is administered each time the metered Xylocaine spray nozzle is depressed.

   REF: p. 111

24. ANS: c
   a. Disposable applicator nozzles help keep the spray nozzle sterile, without requiring a new can of anesthetic spray for each patient.
   b. Covering the spray nozzle with disposable plastic film would likely interfere with the anesthetic spray; disposable applicator nozzles are recommended to keep the spray nozzle sterile.
   c. Correct. A new disposable applicator nozzle should be used with each patient to ensure the sterility of the anesthetic spray nozzle.
   d. Soaking the nozzle in cold sterile solution is not recommended; however, using a disposable applicator nozzle for each patient is.

   REF: p. 111

25. ANS: a
   a. Correct. 4 inch gauze squares are recommended to stop intraoral bleeding.
   b. 2 gauze squares are best used to cleanse the injection site.
   c. 2 gauze squares are best used to retract the lips and cheeks.
   d. 2 gauze squares are best used to dry the mucous membrane.

   REF: p. 111
Multiple Choice

1. Which is the final step of preparing a breech-loaded metallic syringe?
   a. Retract the piston.
   b. Insert the cartridge.
   c. Engage the harpoon.
   d. Remove the needle cap.

2. With a breech-loading syringe, insert
   a. the stopper end of the cartridge first.
   b. the diaphragm end of the cartridge first.
   c. the cartridge level and parallel to the syringe barrel.
   d. the cartridge perpendicular to the barrel of the syringe.

3. Which technique is recommended to engage the harpoon?
   a. Hold the syringe as if injecting.
   b. Hit the thumb ring with a quick, firm tap.
   c. Hold the syringe perpendicular to the floor.
   d. Gently twist the thumb ring with modest pressure.

4. Most plastic hubbed needles are prethreaded. Prethreaded needles are pushed and twisted onto the syringe.
   a. Both statements are true.
   b. Both statements are false.
   c. The first statement is true; the second is false.
   d. The first statement is false; the second is true.

5. After removing the colored needle cap, a few drops of anesthetic are expelled to
   a. test for proper flow.
   b. confirm adequate harpoon engagement.
   c. wet the tip of the needle with anesthetic.
   d. remove air bubbles from the cartridge and needle.

6. Which sequence ensures safe and effective syringe assembly?
   a. Attach needle to syringe, insert cartridge, engage harpoon.
   b. Insert cartridge, engage harpoon, attach needle to syringe.
   c. Engage harpoon, attach needle to syringe, insert cartridge.
   d. Insert cartridge, attach needle to syringe, engage harpoon.
7. Most health and safety agencies recommend which needle recapping technique?
   a. Two-handed twist.
   b. One-handed scoop.
   c. Plastic needle cap holder.
   d. Disposable needle sheath prop.

8. Dental safety needles and syringes
   a. are still in the development stage.
   b. represent the current standard of care.
   c. are more popular than traditional dental needles and syringes.
   d. are not yet approved by the Food and Drug Administration (FDA).

9. Health professionals are most likely to incur a needlestick injury
   a. during syringe assembly.
   b. while recapping a used needle.
   c. when unscrewing a recapped needle.
   d. after removing the protective needle cap.

10. To disassemble a breech-style anesthetic syringe, the first step is which?
    a. Remove the recapped needle from the syringe.
    b. Invert the syringe to permit the cartridge to fall free.
    c. Place the used needle in an approved sharps container.
    d. Retract the piston until the harpoon disengages from the plunger.

11. Which syringe component is examined, before discarding a needle?
    a. Barrel.
    b. Harpoon.
    c. Thumb ring.
    d. Needle adaptor.

12. Placing an additional cartridge in a traditional syringe takes approximately
    a. 5–10 seconds.
    b. 10–15 seconds.
    c. 15–20 seconds.
    d. 20–25 seconds.

13. When loading a second cartridge in a traditional syringe, retract the piston immediately after
    a. recapping the needle.
    b. embedding the harpoon.
    c. inserting the new cartridge.
    d. removing the needle from the syringe.

14. Which step is NOT required to assemble a self-aspirating syringe?
    a. Attach the needle to the syringe.
    b. Retract the piston and insert the cartridge.
    c. Gently push the piston forward until the harpoon is engaged.
    d. Remove the protective needle cap and expel a few drops of anesthetic.
15. In which syringe is the cartridge loaded through an open-ended barrel?
   a. Metallic traditional.
   b. UltraSafe aspirating.
   c. Breech-loading plastic.
   d. Metallic self-aspirating.

16. When is the plunger handle attached, to assemble a safety syringe?
   a. After removing the plastic needle cap.
   b. Before inserting the anesthetic cartridge.
   c. After sliding the needle sheath backward.
   d. Before sliding the needle sheath backward.

17. Which confirms that the safety syringe sheath is locked over the handle?
   a. Clicking sound is heard.
   b. Green color band appears.
   c. Needle cap falls from the needle.
   d. Word “LOCKED” becomes visible.

18. Passive aspiration occurs when
   a. the injection begins.
   b. the injection is stopped.
   c. gentle pressure is applied to the thumb ring.
   d. negative pressure is applied to the thumb ring.

19. Active aspiration is best observed when how much solution has been expelled?
   a. 0.05 to .10 mL.
   b. 0.10 to 0.15 mL.
   c. 0.15 to 0.25 mL.
   d. 0.25 to 0.35 mL.

20. Which component of the safety syringe is autoclavable?
   a. Barrel.
   b. Sheath.
   c. Handle.
   d. Needle.

21. Which statement is true?
   a. Safety syringes cannot be used with multiple cartridges.
   b. The safety syringe handle is removed to lock the injectable system.
   c. If multiple injections are required, a new safety syringe is needed for each one.
   d. The safety syringe handle is peeled from the injectable system in one movement.

22. Which part of the injectable system is used to remove a cartridge from a safety syringe?
   a. Sheath.
   b. Plunger.
   c. Finger grip.
   d. Thumb ring.
23. The plastic cap that protects the syringe-penetrating end of a needle is
   a. red.
   b. blue.
   c. white.
   d. yellow.

24. Hitting the piston to engage the harpoon may cause which complication?
   a. Bent harpoon.
   b. Barbed needle.
   c. Broken cartridge.
   d. Extruded stopper.

25. Which eliminates the need for excessive force to engage the harpoon?
   a. Retract the piston after placing the cartridge.
   b. Attach the needle after placing the cartridge.
   c. Retract the piston before placing the cartridge.
   d. Attach the needle before placing the cartridge.

**Feedback**

1. ANS: d
   a. Retracting the piston in anticipation of loading the cartridge precedes needle cap removal.
   b. Inserting the cartridge precedes needle cap removal.
   c. Engaging the harpoon precedes needle cap removal.
   d. Correct. Carefully removing the protective needle cap is the final step when preparing the anesthetic armamentarium.

   REF: p. 113

2. ANS: a
   a. Correct. Insert the stopper end of the cartridge first, when loading a breech-style cartridge.
   b. The diaphragm end of the cartridge is loaded last, not first.
   c. With a breech-loading syringe, insert the stopper end of the cartridge first.
   d. With a breech-loading syringe, insert the stopper end of the cartridge first; the cartridge cannot be loaded perpendicular to the barrel of the syringe.

   REF: pp. 113–114; Figure 9-3

3. ANS: a
   a. Correct. To engage the harpoon, hold the syringe as if injecting and apply gentle pressure to the thumb ring.
   b. Hitting the thumb ring with excessive force is discouraged and may lead to a cracked or shattered cartridge.
   c. To safely engage the harpoon, the syringe should be held as if injecting, not perpendicular to the floor.
   d. Applying gentle finger pressure is adequate to engage the harpoon in the rubber stopper; twisting the piston with moderate pressure is not recommended.

   REF: p. 113
4. **ANS: c**
   a. The second statement is false. Unthreaded, not prethreaded, needles require pressure while being twisted onto the syringe.
   b. The first statement is true. Most needles are prethreaded.
   c. **Correct.** The first statement is true; most metal and plastic hubbed needles are prethreaded. However, the second statement is false. Prethreaded needles are screwed onto the syringe with minimal pressure; unthreaded needles are pushed on the syringe, while being turned.
   d. The first statement is true; the second is false.

**REF: p. 113**

5. **ANS: a**
   a. **Correct.** After removing the colored needle cap, a few drops of anesthetic are expelled to test for proper flow.
   b. Expelling a few drops of anesthetic does not verify the engagement of the harpoon. The purpose of expelling a few drops of solution after syringe assembly is to test for proper flow.
   c. Wetting the tip of the needle with anesthetic is not required, or recommended. The purpose of expelling a few drops of solution after syringe assembly is to test for proper flow.
   d. Expelling a few drops of anesthetic does not remove air from the cartridge. The purpose of expelling a few drops of solution after syringe assembly is to test for proper flow.

**REF: p. 113**

6. **ANS: b**
   a. Attaching the needle to the syringe before harpoon engagement may lead to broken cartridges and anesthetic leakage.
   b. **Correct.** To correctly assemble the anesthetic syringe, the cartridge is inserted first, then the harpoon is engaged, and finally the needle is attached to the syringe.
   c. The harpoon cannot be engaged first, because the cartridge is not present.
   d. Engaging the harpoon after the cartridge is inserted is recommended to prevent cartridge breakage and anesthetic leakage.

**REF: p. 113**

7. **ANS: b**
   a. Using two hands to recap a needle is highly discouraged; most health and safety agencies recommend the one-handed scoop technique.
   b. **Correct.** Most health and safety agencies recommend the one-handed scoop technique to recap a needle.
   c. Plastic needle cap holders are a safe alternative to the one-handed scoop technique; however, most health and safety agencies recommend the one-handed scoop technique.
   d. Disposable needle sheath props are a safe alternative to the one-handed scoop technique; however, most health and safety agencies recommend the one-handed scoop technique.

**REF: p. 113**
8. ANS: a  
   a. Correct. Dental safety needles and syringes are still in the development stage.  
   b. Dental safety needles and syringes currently leave much to be desired; they do not represent the current standard of care.  
   c. Traditional needles and syringes are more popular than safety needles and syringes, which are still in the development stage.  
   d. The FDA approves safety syringes; still, they leave much to be desired.

   REF: pp. 83, 113

9. ANS: b  
   a. Needlestick injuries occur most often during needle recapping, not syringe assembly.  
   b. Correct. Health professionals are most likely to incur a needlestick injury when recapping a used needle.  
   c. Needlestick injuries occur most often when recapping a needle, not when unscrewing a recapped needle.  
   d. Needlestick injuries occur most often when recapping a needle, not when removing the protective needle cap.

   REF: p. 113

10. ANS: d  
    a. Removing the recapped needle from the syringe is the next to last, not first, step in dissembling a breech-style syringe.  
    b. Inverting the syringe to allow the cartridge to fall free is the second step in dissembling a breech-style syringe.  
    c. Placing the used needle in an approved sharps container is the last step in dissembling a breech-style syringe.  
    d. Correct. The first step to dissembling a breech-style anesthetic cartridge is to retract the piston, thereby disengaging the harpoon from the plunger.

   REF: pp. 113, 117

11. ANS: d  
    a. The needle adaptor, not the barrel, may be inadvertently discarded with the needle.  
    b. The needle adaptor, not the harpoon, may be inadvertently discarded with the needle.  
    c. The needle adaptor, not the thumb ring, may be inadvertently discarded with the needle.  
    d. Correct. Before discarding a needle, the needle adaptor is examined to ensure it is not accidentally thrown away.

   REF: pp. 117–118; Figure 9-11

12. ANS: b  
    a. Loading an additional cartridge in a syringe takes more time, approximately 10–15 seconds.  
    c. Loading an additional cartridge in a syringe takes less time, approximately 10–15 seconds.  
    d. Loading an additional cartridge in a syringe takes less time, approximately 10–15 seconds.

   REF: p. 118
13. ANS: d
   a. Recapping the needle is the first step in loading a second cartridge; however, before the piston is retracted, the recapped needle is removed from the syringe.
   b. Embedding the harpoon does not precede retracting the piston; it precedes needle reattachment.
   c. Inserting a new cartridge precedes embedding the harpoon, not disengaging it by retracting the piston.
   d. Correct. To place a second cartridge in a syringe, retract the piston, which disengages the harpoon, after removing the recapped needle from the syringe.

REF: pp. 117–118

14. ANS: c
   a. Needle attachment is required to assemble a self-aspirating syringe.
   b. Retracting the piston to insert the cartridge is required to assemble a self-aspirating syringe.
   c. Correct. Self-aspirating syringes do not have a harpoon; harpoon engagement is not required to assemble a self-aspirating syringe.
   d. Removing the protective needle cap to expel a few drops of anesthetic is the final step in assembling a self-aspirating syringe.

REF: p. 118

15. ANS: b
   a. Metallic traditional syringes are loaded through a large opening in the side of the barrel; both ends of the traditional syringe are closed.
   b. Correct. The UltraSafe aspirating safety syringe is loaded through the open end of the syringe barrel.
   c. Breech-loading plastic syringes are loaded through a large opening in the side of the barrel; both ends of breech-style syringes are closed.
   d. Metallic self-aspirating syringes are loaded through a large opening in the side of the barrel; both ends of this syringe are closed.

REF: p. 118

16. ANS: d
   a. The handle of a safety syringe is attached before, not after, removing the plastic needle cap.
   b. The handle of a safety syringe is attached after, not before, inserting the anesthetic cartridge.
   c. The handle of a safety syringe is attached before, not after, sliding the needle sheath backward.
   d. Correct. The plunger handle of a safety syringe is attached before sliding the needle sheath backward to lock the handle and barrel together.

REF: pp. 118–119
17. ANS: a
   a. **Correct.** An audible click is heard as the protective safety syringe sheath locks the handle to the barrel.
   b. A colored band does *not* appear to confirm that the syringe sheath is locked over the handle. Instead, an audible clicking sound is heard.
   c. The needle cap does *not* fall from the needle when the syringe sheath is locked over the handle. Instead, an audible clicking sound is heard.
   d. The word “LOCKED” does *not* materialize on the safety syringe to confirm that the sheath is locked over the handle. Instead, an audible clicking sound is heard.

REF: pp. 118–119

18. ANS: b
   a. Passive aspiration occurs when the injection is stopped, not when it begins.
   b. **Correct.** Passive aspiration occurs when the injection is paused or stopped.
   c. Active injection occurs when gentle pressure is applied to the thumb ring.
   d. Active aspiration occurs when negative pressure is applied to the thumb ring.

REF: p. 119

19. ANS: d
   a. Approximately 0.25 to 0.35 mL, not 0.05 to 0.10 mL, of anesthetic should be expelled to make room in the cartridge for an easily observable aspiration.
   b. Approximately 0.25 to 0.35 mL, not 0.10 to 0.15 mL, of anesthetic should be expelled to make room in the cartridge for an easily observable aspiration.
   c. Approximately 0.25 to 0.35 mL, not 0.15 to 0.25 mL, of anesthetic should be expelled to make room in the cartridge for an easily observable aspiration.
   d. **Correct.** A minimum of 0.25 to 0.35 mL of anesthetic solution must first be expelled to produce an easily observed aspiration.

REF: p. 119

20. ANS: c
   a. The barrel of the safety syringe is disposable, and should not be autoclaved.
   b. The sheath of the safety syringe is disposable, and should not be autoclaved.
   c. **Correct.** The handle of the safety syringe is autoclavable.
   d. The needle of the safety syringe is disposable, and should not be autoclaved; in fact, needles of any kind should never be reused or autoclaved.

REF: p. 121

21. ANS: d
   a. Safety syringes can be used with multiple cartridges.
   b. The protective syringe sheath slides forward to lock the injectable system; the handle should be removed only once the sheath is locked in place.
   c. The protective syringe sheath slides forward to the holding position, if multiple injections are required; multiple injections can be made with one safety syringe.
   d. **Correct.** The handle of the safety syringe is peeled from the injectable system in one movement.

REF: p. 121
22. **ANS: b**
   a. The plunger of the handle, not the protective sheath, is used to remove an empty cartridge from a safety syringe.
   b. **Correct.** The plunger of the injection system handle is inserted into the empty cartridge to remove it from the safety syringe.
   c. The plunger of the handle, not the finger grip, is used to remove an empty cartridge from a safety syringe.
   d. The plunger of the handle, not the thumb ring, is used to remove an empty cartridge from a safety syringe.

   **REF:** p. 121

23. **ANS: c**
   a. A white, not red, cap protects the syringe-penetrating end of the needle.
   b. A white, not blue, cap protects the syringe-penetrating end of the needle.
   c. **Correct.** A white or clear plastic cap protects the syringe-penetrating aspect of the needle.
   d. A white, not yellow, cap protects the syringe-penetrating end of the needle.

   **REF:** p. 113

24. **ANS: c**
   a. A broken cartridge is a probable consequence of hitting the piston with excessive force; a bent harpoon is not.
   b. A broken cartridge is a probable consequence of hitting the piston with excessive force; a barbed needle is not.
   c. **Correct.** Hitting the piston to engage the harpoon may cause the glass cartridge to fracture, break, or shatter.
   d. A broken cartridge is a probable consequence of hitting the piston with excessive force; an extruded stopper is not.

   **REF:** p. 113

25. **ANS: b**
    a. Retracting the piston after placing the cartridge has no bearing on the force required to engage the harpoon; placing the cartridge and engaging the harpoon before attaching the needle will eliminate the need for excessive force.
    b. **Correct.** Placing the cartridge and engaging the harpoon before attaching the needle eliminates the need for excessive force to engage the harpoon.
    c. Retracting the piston before placing the cartridge is necessary but has no bearing on the force required to engage the harpoon; placing the cartridge and engaging the harpoon before attaching the needle will eliminate the need for excessive force.
    d. Attaching the needle before placing the cartridge will necessitate firm pressure to engage the harpoon, whereas placing the cartridge and engaging the harpoon before attaching the needle eliminates the need for excessive force.

   **REF:** p. 113
Physical and Psychological Evaluation

Multiple Choice

1. Most adverse outcomes to local anesthetics are caused by
   a. organ dysfunction.
   b. the anesthetic drug.
   c. the immune response.
   d. psychogenic reactions.

2. Life-threatening emergencies in the dental practice are preventable
   a. 100% of the time.
   b. 90% of the time.
   c. 80% of the time.
   d. 70% of the time.

3. Each, EXCEPT one, is a component of the physical evaluation. Which is the EXCEPTION?
   a. Dental charting.
   b. Dialogue history.
   c. Physical examination.
   d. Medical history questionnaire.

4. The value of the medical questionnaire depends primarily upon
   a. the number of items or length of the form.
   b. whether the questionnaire is computer-generated.
   c. the practitioner’s ability to identify key information and ask questions.
   d. the office protocol for the dental management of medically complex patients.

5. The patient’s informed consent is required to complete which document?
   a. Medical consultation form.
   b. Health history interview sheet.
   c. Adult health history questionnaire.
   d. Pediatric medical history questionnaire.

6. The adult health history questionnaire developed by the University of the Pacific School of Dentistry and MetLife is available in which number of languages?
   a. 11.
   b. 24.
   c. 36.
   d. 43.
7. Most available health history questionnaires lack which important question? 
   a. Are you being treated by a physician now? 
   b. Do you feel very nervous about having dental treatment? 
   c. Has there been a change in your health within the last year? 
   d. Do you have any other medical problems or diseases not listed on this form? 

8. The names of the patient’s medications are recorded in response to which question? 
   a. Are you in pain now? 
   b. Is your general health good? 
   c. Have you had problems with prior dental treatment? 
   d. Are you being treated by a physician now? For what? 

9. Which patient is least likely to verbally disclose fear of dental treatment? 
   a. 30-year-old male. 
   b. 18-year-old male. 
   c. 10-year-old female. 
   d. 50-year-old female. 

10. Sedation is which, for an anginal patient with significant dental fear? 
    a. Relatively indicated. 
    b. Absolutely indicated. 
    c. Relatively contraindicated. 
    d. Absolutely contraindicated. 

11. Each, EXCEPT one, may indicate possible heart failure. Which is the EXCEPTION? 
    a. Swollen ankles. 
    b. Persistent cough. 
    c. Shortness of breath. 
    d. Unexpected weight change. 

12. Which injection technique should be avoided in patients with a reported bleeding disorder? 
    a. Intraosseous. 
    b. Supraperiosteal. 
    c. Inferior alveolar. 
    d. Periodontal ligament. 

13. Which treatment modification is specific to sinus problems? 
    a. Forego the use of a rubber dam. 
    d. Use articaine in place of other amide local anesthetics. 

14. Dysphagia is 
    a. the inability to swallow. 
    b. chronic excessive dry mouth. 
    c. the presence of blood in the urine. 
    d. an auditory sensation despite the absence of sound.
15. The most common medical emergency encountered in dentistry is
   a. stroke.
   b. anaphylaxis.
   c. epileptic seizure.
   d. vasodepressor syncope.

16. Epileptic patients whose seizures occur infrequently are classified as
   a. ASA 1.
   b. ASA 2.
   c. ASA 3.
   d. ASA 4.

17. Polydipsia and polyuria are indicators of which systemic disease?
   a. Hypertension.
   b. Atherosclerosis.
   c. Diabetes mellitus.
   d. Sjögren syndrome.

18. Following a myocardial infarction, elective dental treatment should be postponed for
   a. 1 year.
   b. 3 weeks.
   c. 3 months.
   d. 6 months.

19. Heart murmurs are a very rare occurrence, today. However, all detectable murmurs are clinically significant.
   a. Both statements are true.
   b. Both statements are false.
   c. The first statement is true; the second is false.
   d. The first statement is false; the second is true.

20. A history of drug addiction may increase the likelihood of which?
   a. Glaucoma.
   b. Emphysema.
   c. Rheumatic fever.
   d. Hepatic dysfunction.

21. Which local anesthetic can induce methemoglobinemia?
   a. Articaine.
   b. Lidocaine.
   c. Prilocaine.
   d. Bupivacaine.

22. Which is an absolute contraindication to the administration of local anesthetics?
   a. Anesthetic allergy.
   b. Malignant hyperthermia.
   c. Atypical plasma cholinesterase.
   d. Congenital methemoglobinemia.
23. Dental treatment should be postponed if the patient has recently used which drug?
   a. Cocaine.
   b. Opioid analgesics.
   c. Tricyclic antidepressants.
   d. Nonselective beta-blockers.

24. Elective dental care is contraindicated for which ASA classification?
   a. 1.
   b. 2.
   c. 3.
   d. 4.

25. Which patient should be weighed, before receiving local anesthetic?
   a. Obese.
   b. Pediatric.
   c. Geriatric.
   d. Hypertensive.

Feedback

1. ANS: d
   a. Most adverse reactions to local anesthetics are caused by the patient’s psychogenic response to the act of receiving local anesthesia, not organ dysfunction.
   b. Most adverse reactions to local anesthetics are caused by the patient’s psychogenic response to the act of receiving local anesthesia, not the anesthetic drug.
   c. Immune response can produce an undesirable reaction; however, most adverse reactions to local anesthetics are caused by the patient’s psychogenic response to the act of receiving local anesthesia.
   d. Correct. The patient’s psychogenic reaction to the act of receiving local anesthesia is usually the cause of adverse outcomes to local anesthetics.

REF: p. 124

2. ANS: b
   a. Although 100% of the life-threatening emergencies encountered in the dental office are not preventable, 90% of them are.
   b. Correct. 90% of all life-threatening emergencies in the dental practice are preventable.
   c. 90%, not 80%, of all life-threatening emergencies encountered in the dental office are preventable.
   d. 90%, not 70%, of all life-threatening emergencies encountered in the dental office are preventable.

REF: p. 124
3. ANS: a  
   a. Correct. Dental charting is NOT a function of the physical evaluation, but rather the dental examination. 
   b. The dialogue history is an important component of the physical evaluation. 
   c. The physical examination is an important component of the physical evaluation. 
   d. The medical history questionnaire is an important component of the physical evaluation. 

   REF: p. 125

4. ANS: c  
   a. The number of items contained on a medical questionnaire, or its length, has little bearing on its value. The practitioner's ability to identify key information and ask questions determines the worth of the medical history questionnaire. 
   b. Whether the questionnaire is computer-generated has little bearing on its value. The practitioner's ability to identify key information and ask questions determines the worth of the medical history questionnaire. 
   c. Correct. The value of the medical questionnaire is entirely dependent on the practitioner's ability to recognize the significance of the disclosed information and follow-up through dialogue history and physical examination. 
   d. The office protocol for the management of medically complex patients has little bearing on the value of the medical questionnaire. The practitioner's ability to identify key information and ask questions determines the worth of the medical history questionnaire. 

   REF: p. 125

5. ANS: a  
   a. Correct. The patient's informed consent to the release of his or her medical information, verified by signature, is prerequisite to completing the medical consultation form. 
   b. A signature verifying informed consent is not required to complete the health history interview sheet. 
   c. The patient is required to sign the health history questionnaire, but this is to verify the accuracy of the provided information, not give informed consent. 
   d. The pediatric patient does not grant informed consent for the completion of the pediatric medical history questionnaire. The child's guardian is required to sign the health history questionnaire, but this is to verify the accuracy of the provided information, not give informed consent. 

   REF: p. 130; Figure 10-5

6. ANS: c  
   a. This adult health history form is available in 36 different languages, not 11. 
   b. This adult health history form is available in 36 different languages, not 24. 
   c. Correct. The University of the Pacific School of Dentistry and MetLife have collaborated to produce a comprehensive health history form, in 36 different languages. These forms are widely available for professional use. 
   d. This adult health history form is available in 36 different languages, not 43. 

   REF: p. 125
7.ANS: b
   a. Most health history questionnaires neglect to address the patient’s attitudes toward
dentistry; whether the patient is seeing a physician is usually addressed.
b. Correct. Most health history questionnaires neglect to address the patient’s attitudes
toward dentistry.
c. Most health history questionnaires neglect to address the patient’s attitudes toward
dentistry; changes in the patient’s medical history are usually addressed.
d. Most health history questionnaires neglect to address the patient’s attitudes toward
dentistry; other medical problems and diseases are usually addressed.

REF: p. 131

8.ANS: d
   a. The point of asking the patient if he or she is in pain is to determine the need for imme-
diate or emergency dental care.
b. Inquiring into the general health of the patient gives the clinician an overall impression
of the patient’s perspective on their health.
c. Determining the patient’s attitudes toward dentistry assists in identifying individuals with
a high probability of adverse psychogenic reactions.
d. Correct. The point of asking the patient if he or she is being treated by a physician is
to ascertain the nature of any change in health status, the type of surgical procedure or
illness, and the names of medications the patient is taking.

REF: p. 131

9.ANS: b
   a. Younger men, in their late teens and early twenties, are least likely to admit dental phobia.
b. Correct. Young men in their late teens and early twenties are especially reluctant to admit
fears associated with dental treatment.
c. Young men in their late teens and early twenties are least likely to reveal dental phobia;
young girls are more prone to disclosing feelings of apprehension toward dental treatment.
d. Young men in their late teens and early twenties are least likely to reveal dental phobia;
middle-aged women are more prone to disclosing feelings of apprehension toward dental
 treatment.

REF: p. 131

10.ANS: b
   a. Sedation is absolutely, not relatively, indicated for the anginal patient with significant
dental fear.
b. Correct. Sedation, preferably inhalation nitrous oxide–oxygen, is absolutely indicated for
an anginal patient with significant dental fear.
c. Sedation is not relatively contraindicated for the anginal patient with significant dental
fear; in fact, it is absolutely indicated.
d. Sedation is not absolutely contraindicated for the anginal patient with significant dental
fear; in fact, it is absolutely indicated.

REF: p. 131
11. ANS: b
   a. Swollen ankles may indicate possible heart failure.
   b. Correct. A persistent cough most likely indicates the presence of a chronic respiratory disorder, like tuberculosis, not heart failure.
   c. Shortness of breath may indicate possible heart failure.
   d. Unexpected weight change may indicate possible heart failure.

   REF: p. 132

12. ANS: c
   a. When a bleeding disorder is present, the intraosseous injection technique is recommended to replace injections that are likely to produce bleeding.
   b. When a bleeding disorder is present, the supraperiosteal injection technique is recommended to replace injections that are likely to produce bleeding.
   c. Correct. The inferior alveolar nerve block (IANB) requires penetration of extremely vascular tissue and should be replaced with another technique less likely to produce bleeding.
   d. When a bleeding disorder is present, the periodontal ligament injection technique is recommended to replace injections that are likely to produce bleeding.

   REF: p. 132

13. ANS: a
   a. Correct. Foregoing the use of a rubber dam is advised in the presence of sinus problems.
   b. Nitrous oxide–oxygen sedation is a recommended treatment modification for epileptic patients with dental phobia.
   c. Supplemental oxygen is recommended for the treatment of patients with sickle cell anemia.
   d. Articaine should be used in place of other amide local anesthetics in patients with hepatic dysfunction.

   REF: p. 132

14. ANS: a
   a. Correct. Dysphagia is the inability to swallow.
   b. Xerostomia is chronic dry mouth, whereas dysphagia is the inability to swallow.
   c. Hematuria is the presence of blood in the urine, whereas dysphagia is the inability to swallow.
   d. Tinnitus is an auditory sensation (ringing in ears) in the absence of sound, whereas dysphagia is the inability to swallow.

   REF: p. 132
15. **ANS:** d
   a. Vasodepressor syncope, or fainting, is more likely to occur in the dental office than stroke.
   b. Vasodepressor syncope, or fainting, is more likely to occur in the dental office than anaphylaxis.
   c. Vasodepressor syncope, or fainting, is more likely to occur in the dental office than an epileptic seizure.
   d. **Correct.** Vasodepressor syncope, or fainting, is the most common medical emergency encountered in today’s dental practice.

   **REF:** p. 133

16. **ANS:** b
   a. An epileptic patient whose seizures are under control is believed to exhibit mild systemic disease and is therefore classified as an ASA 2, not ASA 1, risk.
   b. **Correct.** An epileptic patient whose seizures are under control is an ASA 2 risk.
   c. An epileptic patient whose seizures are under control is believed to exhibit mild systemic disease and is therefore classified as an ASA 2, not ASA 3, risk. ASA 3 classifications are reserved for cases of severe systemic disease.
   d. An epileptic patient whose seizures are under control is believed to exhibit mild systemic disease and is therefore classified as an ASA 2, not ASA 4, risk. ASA 4 classifications are reserved for cases where severe systemic disease is a constant threat to life.

   **REF:** p. 133

17. **ANS:** c
   a. Polydipsia and polyuria are linked to diabetes mellitus, not hypertension.
   b. Polydipsia and polyuria are linked to diabetes mellitus, not atherosclerosis.
   c. **Correct.** Excessive thirst (polydipsia) and frequent urination (polyuria) are indicators associated with diabetes mellitus.
   d. Polydipsia and polyuria are linked to diabetes mellitus, not Sjögren syndrome.

   **REF:** p. 133

18. **ANS:** d
   a. When little or no damage to the myocardium is present after 6 months, the patient who experienced a myocardial infarction is considered an ASA 2 risk, and can safely undergo elective dental treatment.
   b. Although recent evidence suggests that many patients can tolerate stress in as few as 3 weeks, elective dental treatment should be postponed for 6 months following a myocardial infarction.
   c. Elective dental treatment should be postponed for 6, not 3, months following a myocardial infarction.
   d. **Correct.** Elective dental treatment should be postponed for 6 months following a myocardial infarction.

   **REF:** p. 134
19. **ANS:** b
   a. Both statements are false, not true.
   b. **Correct.** Both statements are false. Heart murmurs are a common, not rare, occurrence. In addition, not all heart murmurs are clinically significant.
   c. The first statement is false; heart murmurs are a common, not rare, occurrence.
   d. The second statement is false; all detectable murmurs are *not* clinically significant.

**REF:** p. 134

20. **ANS:** d
   a. Hepatic dysfunction, not glaucoma, is a common finding in the parenteral drug abuse patient.
   b. Hepatic dysfunction, not emphysema, is a common finding in the parenteral drug abuse patient.
   c. Hepatic dysfunction, not rheumatic fever, is a common finding in the parenteral drug abuse patient.
   d. **Correct.** Drug addiction, specifically the abuse of parenteral drugs, may increase the likelihood of hepatic dysfunction.

**REF:** p. 136

21. **ANS:** c
   a. Prilocaine, not articaine, can induce methemoglobinemia.
   b. Prilocaine, not lidocaine, can induce methemoglobinemia.
   c. **Correct.** Prilocaine can produce elevated methemoglobin levels to induce methemoglobinemia in individuals with congenital methemoglobinemia.
   d. Prilocaine, not bupivacaine, can induce methemoglobinemia.

**REF:** p. 153

22. **ANS:** a
   a. **Correct.** Allergy is an absolute contraindication to the administration of local anesthetics.
   b. Malignant hyperthermia is a relative, not absolute, contraindication to the administration of local anesthetics.
   c. Atypical plasma cholinesterase is a relative, not absolute, contraindication to the administration of local anesthetics.
   d. Congenital methemoglobinemia is a relative, not absolute, contraindication to the administration of local anesthetics.

**REF:** p. 147
23. **ANS: a**
   a. **Correct.** A patient that has used, or is suspected of using, cocaine within 24 hours of any dental appointment should be released and reappointed; cocaine use is associated with a plethora of potentially fatal complications, many of which are exacerbated when a vasopressor is inadvertently administered.
   b. Dental treatment should be postponed when a patient is suspected of recent cocaine use (within 24 hours). Opioid analgesics may increase the risk of local anesthetic overdose, but patient dismissal is not recommended.
   c. Dental treatment should be postponed when a patient is suspected of recent cocaine use (within 24 hours). Tricyclic antidepressants increase the likelihood of hypertensive crisis when vasoconstrictors are used, but patient dismissal is not recommended.
   d. Dental treatment should be postponed when a patient is suspected of recent cocaine use (within 24 hours). Vasoconstrictors elevate the blood pressure when used in conjunction with nonselective beta-blockers, but patient dismissal is not recommended.

   **REF:** p. 149

24. **ANS: d**
   a. An ASA 1 classification is assigned to healthy patients; elective dental care is fine.
   b. An ASA 2 classification is assigned to patients with mild systemic disease; elective dental care is fine, although treatment modifications may be necessary.
   c. An ASA 3 is classification is assigned to patients with severe systemic disease that limits activity but is not incapacitating; elective dental care is okay, but treatment modifications must be seriously considered.
   d. **Correct.** An ASA 4 classification indicates incapacitating systemic disease that is a constant threat to life; elective dental care is contraindicated.

   **REF:** p. 147

25. **ANS: b**
   a. Young, lightweight, not obese, patients should be weighed before receiving local anesthetic.
   b. **Correct.** Pediatric patients should be weighed before receiving local anesthetic.
   c. Pediatric patients should be weighed before receiving local anesthetic. Lightweight, geriatric patients are unlikely to weigh less than 30 kg (66 lb).
   d. Pediatric, not hypertensive, patients should be weighed before receiving local anesthetic.

   **REF:** p. 144
Multiple Choice

1. Which is the most sensitive area of the mouth to receive local anesthetic?
   b. Pulp chamber.
   c. Buccal mucosa.
   d. Gingival sulcus.

2. To enhance patient comfort, a new disposable stainless steel needle is used
   a. after every one or two tissue penetrations.
   b. after every three or four tissue penetrations.
   c. after every five or six tissue penetrations.
   d. after every seven or eight tissue penetrations.

3. Which is symptomatic of a barbed needle?
   a. Traumatic needle insertion and withdrawal.
   b. Atraumatic needle insertion and withdrawal.
   c. Traumatic needle insertion; atraumatic needle withdrawal.
   d. Atraumatic needle insertion; traumatic needle withdrawal.

4. Which needle gauge is associated with increased pain on initial insertion?
   a. 23.
   b. 25.
   c. 27.
   d. 30.

5. Following syringe assembly, how much anesthetic solution is expelled to confirm free flow?
   a. A few drops.
   b. A few milliliters.
   c. One third of a cartridge.
   d. One fourth of a cartridge.

6. Injecting overly warm local anesthetic elicits pain; however, warming the anesthetic cartridge
   to body temperature reduces the discomfort of injection.
   a. Both statements are true.
   b. Both statements are false.
   c. The first statement is true; the second is false.
   d. The first statement is false; the second is true.
7. Before administering local anesthesia, the patient is placed in which position?
   a. Supine.
   b. Upright.
   c. Semi-supine.
   d. Trendelenburg.

8. Topical antiseptic is applied immediately
   a. after drying the tissue.
   b. before positioning the patient.
   c. after applying topical anesthetic.
   d. before inserting the needle into the mucosa.

9. For optimal surface anesthesia, topical anesthetic should remain at the penetration site for
   a. 1 minute.
   b. 2 minutes.
   c. 3 minutes.
   d. 4 minutes.

10. Which represents the best patient communication?
    a. “Don’t worry, this won’t hurt a bit.”
    b. “Our dental practice specializes in pain-free shots.”
    c. “I’ll give you a couple quick injections; after that, you won’t feel a thing.”
    d. “This topical anesthetic will make the rest of the procedure more comfortable.”

11. The purpose of establishing a firm hand rest is to
    a. prevent operator muscle fatigue.
    b. stabilize and control the anesthetic syringe.
    c. accelerate the administration of local anesthesia.
    d. reduce the likelihood of unexpected patient movement.

12. Which hand rest is NOT recommended for the delivery of local anesthesia?
    a. Arm.
    b. Chin.
    c. Chest.
    d. Cheek.

13. Which hand position provides the most stable administration of local anesthesia?
    a. Palm up with ring and pinky fingers resting in palm.
    b. Palm down with ring and pinky fingers resting in palm.
    c. Palm up with ring finger resting on the syringe barrel and pinky finger stacked.
    d. Palm down with ring finger resting on the syringe barrel and pinky finger stacked.

14. Tissues at the site of needle penetration should be
    a. vibrated.
    b. stretched taut.
    c. pulled over the needle.
    d. pinched in a loose fold.
15. As a general rule, the bevel of the needle should be positioned
   a. toward the bone.
   b. toward the midline.
   c. away from the bone.
   d. away from the midline.

16. Which is linked to the use of a buffered local anesthetic?
   a. Increased postoperative soreness.
   b. Decreased likelihood of intravascular injection.
   c. Increased comfort during the deposition of local anesthetic.
   d. Absence of pain as the needle advances through the surface mucosa.

17. As the needle passes between the surface mucosa and the mucoperiosteum, pain is a
   a. definite occurrence.
   b. common occurrence.
   c. uncommon occurrence.
   d. rare occurrence.

18. The amount of anesthetic solution used to reach the deposition site must not exceed
   a. one half of a cartridge.
   b. one fourth of a cartridge.
   c. one eighth of a cartridge.
   d. one sixteenth of a cartridge.

19. Aspiration is crucial at which point?
   a. Before depositing the anesthetic solution at the target site.
   b. After burying the bevel of the needle in the surface mucosa.
   c. Before injecting several drops of anesthetic solution to advance the needle.
   d. During needle advancement, preceding the release of any anesthetic solution.

20. Anesthetizing the periosteum is necessary in each nerve block, EXCEPT one. Which is the
    EXCEPTION?
    a. Infraorbital.
    b. Inferior alveolar.
    c. Gow-Gates mandibular.
    d. Posterior superior alveolar.

21. A positive aspiration is identified by which?
    a. Profound anesthesia.
    b. Blood within the cartridge.
    c. A tingling or burning sensation.
    d. Dizziness, apprehension, and slurred speech.

22. Which is the optimal rate of delivery for 1.8 mL of local anesthetic?
    a. 1 minute.
    b. 2 minutes.
    c. 20 seconds.
    d. 40 seconds.
23. Most adverse reactions to the administration of local anesthesia occur
   a. 30–60 seconds after its completion.
   b. 60–90 minutes after its completion.
   c. immediately following its completion.
   d. within 5–10 minutes of its completion.

24. Which represents a complete and correct entry in the patient’s chart?
   a. L-PSA, 25-short, 2% lido + 1:100,000 epi, 36 mg.
   b. PSA, 25-short, 2% lidocaine + epinephrine, 36 mg.
   c. L-IANB, 25-short, 2% lido (36 mg) +1/100,000 epi (.018 mg or 18 mcg). Tolerated well.
   d. R-IANB, short, lidocaine +1:100,000 epi, three fourths of a cartridge. Tolerated well.

25. How many aspirations are performed, before depositing a larger volume of anesthetic?
   a. One.
   b. Two.
   c. Three.
   d. Four.

Feedback

1. ANS: a
   a. Correct. The palate is the most sensitive area of the mouth to receive local anesthetic; nevertheless, atraumatic palatal injections are possible with proper technique and practice.
   b. Intrapulpal injections are associated with a brief period of pain; however, the most sensitive intraoral area is the palate.
   c. The palate, not buccal mucosa, is the most sensitive region of the mouth.
   d. Periodontal ligament injections are less traumatic than conventional block injection; the palate, not gingival sulcus, is the most sensitive area of the mouth.

REF: p. 157

2. ANS: b
   a. Replacing the needle after every, or every other, injection is unnecessary; a new needle after every three or four tissue penetrations will ensure patient comfort.
   b. Correct. Replacing the needle after every three or four tissue penetrations will facilitate atraumatic injection technique.
   c. A new needle should be attached to the syringe after every three or four, not five or six, tissue penetrations to enhance patient comfort.
   d. A new needle should be attached to the syringe after every three or four, not seven or eight, tissue penetrations to enhance patient comfort.

REF: p. 158
3. **ANS:** d  
   a. A barbed needle rarely produces a traumatic, or painful, insertion.  
   b. A barbed needle will exact pain upon withdrawal as the fishhook-type barb tears unanesthetized tissue.  
   c. A barbed needle is notoriously painless, upon insertion, but painful upon withdrawal (atraumatic needle insertion, traumatic needle withdrawal).  
   d. **Correct.** A barbed needle is identified by atraumatic (painless) needle insertion, but traumatic, (painful) needle withdrawal.

REF: p. 157

4. **ANS:** a  
   a. **Correct.** Needles with a 23 gauge or larger are associated with increased pain on initial tissue penetration.  
   b. Numerous studies have concluded that patients cannot distinguish between 25-, 27-, and 30-gauge needles; 23-gauge needles are associated with increased pain.  
   c. Numerous studies have concluded that patients cannot distinguish between 25-, 27-, and 30-gauge needles; 23-gauge needles are associated with increased pain.  
   d. Numerous studies have concluded that patients cannot distinguish between 25-, 27- and 30-gauge needles; 23-gauge needles are associated with increased pain.

REF: p. 158

5. **ANS:** a  
   a. **Correct.** A few drops are expelled once the anesthetic syringe is completely assembled to confirm free flow before reaching the target deposition site.  
   b. A typical dental cartridge contains only 1.8 mL of anesthetic solution; just a few drops of anesthetic need be expelled to confirm free flow.  
   c. Just a few drops of anesthetic need be expelled to confirm free flow; expelling one third a cartridge is unwarranted.  
   d. Just a few drops of anesthetic need be expelled to confirm free flow; expelling one fourth a cartridge is unwarranted.

REF: p. 158

6. **ANS:** c  
   a. The second statement is false; warming the anesthetic cartridge past room temperature does not alleviate the pain associated with injection. There is no clinical reason to warm a cartridge before its administration.  
   b. The first statement is true. Overly warm anesthetic solution elicits pain upon injection.  
   c. **Correct.** The first statement is true; injecting overly warm local anesthetic is uncomfortable for the patient. The second statement is false; there is no benefit whatsoever associated with warming anesthetic solution past room temperature.  
   d. The first statement is true; the second is false.

REF: p. 158
7. **ANS:** a
   a. **Correct.** To prevent vasodepressor syncope, the patient is placed in a supine position for the administration of local anesthesia.
   b. The supine, not upright, position is recommended for the administration of local anesthesia; in the upright position the likelihood of vasodepressor syncope is increased.
   c. The supine, not semi-supine, position is recommended for the administration of local anesthesia.
   d. The supine, not Trendelenburg, position is recommended for the administration of local anesthesia.

   **REF:** p. 158

8. **ANS:** a
   a. **Correct.** Topical antiseptic is applied immediately after drying the tissue in and around the needle penetration site.
   b. Topical antiseptic is applied after, not before, the patient is positioned and the tissues are dried.
   c. Topical antiseptic is applied before, not after, the application of topical anesthetic.
   d. Topical antiseptic is applied before inserting the needle into the mucosa, but not immediately before. After topical antiseptic is applied, topical anesthetic is applied, a firm hand rest is established, the tissues are stretched while the syringe is kept out of sight, and then the needle is inserted into the mucosa.

   **REF:** pp. 158–159

9. **ANS:** b
   a. Minimal, not optimal, surface anesthesia is achieved when the topical anesthetic remains at the penetration site for 1 minute; 2 minutes of tissue contact produces optimal surface anesthesia.
   b. **Correct.** For optimal surface anesthesia, the topical anesthetic is held in contact with the oral mucosa of the penetration site for 2 minutes.
   c. Optimal surface anesthesia is produced within 2, not 3, minutes of consistent topical anesthetic application.
   d. Optimal surface anesthesia is produced within 2, not 4, minutes of consistent topical anesthetic application.

   **REF:** p. 159

10. **ANS:** d
    a. Using the word “hurt” is not advised. It would be best to rephrase this patient communication to address the benefits of local anesthesia, like increased comfort.
    b. Using the words “pain” and “shots” are not advised. Instead the best communication substitutes these words with less-threatening alternatives.
    c. Using the word “injection” is not advised in patient communication. A more positive phrase, like “administer the local anesthetic,” produces less anxiety.
    d. **Correct.** Using the phrase, “more comfortable,” and referring to the administration of local anesthesia as simply “the procedure,” reduces the anxiety caused by trigger words like pain, hurt, injection, and shot.

    **REF:** p. 159
11. ANS: b
   a. A firm hand rest may incidentally reduce operator muscle fatigue, but the purpose of establishing a firm hand rest is actually to stabilize and control the anesthetic syringe.
   b. **Correct.** A firm hand rest stabilizes and facilitates operator control of the anesthetic syringe.
   c. The purpose of establishing a firm hand rest is to stabilize and control the anesthetic syringe, not accelerate the administration of local anesthesia.
   d. A firm hand rest does *not* reduce the likelihood of unexpected patient movement, rather the purpose of establishing a firm hand rest is to stabilize and control the anesthetic syringe.

REF: p. 159

12. ANS: a
   a. **Correct.** The patient’s arm is a dangerous hand rest, due to the increased risk of inadvertent needle movement and injury.
   b. The patient’s chin is an acceptable hand rest, so long as it permits the syringe to be stabilized.
   c. The patient’s chest is an acceptable hand rest, so long as it permits the syringe to be stabilized.
   d. The patient’s cheek is an acceptable hand rest, so long as it permits the syringe to be stabilized.

REF: p. 162

13. ANS: c
   a. Palm-up hand positions are preferred over palm down, but the addition of finger support produces the greatest stabilization.
   b. Palm down with no finger support is a hand position that exerts poor control over the anesthetic syringe.
   c. **Correct.** Palm up with finger support provides the greatest stabilization for local anesthesia administration.
   d. Finger support provides some support over the anesthetic syringe, but palm-up positions produce more stability than palm-down positions.

REF: p. 160; Figure 11-5

14. ANS: b
   a. Vibrating the tissues at the site of needle penetration is not necessary; stretching the tissues taut, however, improves the patient’s comfort.
   b. **Correct.** Tissues at the site of needle penetration should be stretched taut, to reduce the resistance, and thereby the discomfort, of the needle cutting through the mucous membrane.
   c. Pulling the tissues over the needle impairs the visualization of the injection site; stretching the tissues taut, however, improves the patient’s comfort.
   d. Pinching the tissues in a loose fold is not recommended as sound injection technique; tissues at the site of needle penetration should be stretched taut.

REF: p. 162; Figure 11-9
15. ANS: a
   a. Correct. Although each injection has a specific bevel orientation, as a general rule, the
      bevel of the needle should be positioned toward the bone.
   b. Generally speaking, the bevel of the needle should be positioned toward the bone, not
      the midline.
   c. Generally speaking, the bevel of the needle should be positioned toward, not away from,
      the bone.
   d. Generally speaking, the bevel of the needle should be positioned toward the bone, not
      away from the midline.

   REF: p. 163

16. ANS: c
   a. Postoperative soreness is not linked to the use of buffered local anesthetics; increased
      comfort during the injection is.
   b. Buffered local anesthetics do not decrease the likelihood of intravascular injection;
      however, the injection is likely to be more comfortable for the patient.
   c. Correct. Buffered local anesthetic solutions increase patient comfort during anesthetic
      deposition.
   d. Buffered local anesthetics are not linked to the absence of pain during needle penetration;
      increased comfort during the injection is anticipated with the use of a buffered anesthetic
      solution.

   REF: p. 162

17. ANS: d
   a. Pain is a rare, not a definite, occurrence as the needle passes through the tissues between
      the surface mucosa and the mucoperiosteum.
   b. Pain is a rare, not a common, occurrence as the needle passes through the tissues between
      the surface mucosa and the mucoperiosteum.
   c. Pain is a rare occurrence as the needle passes through the tissues between the surface
      mucosa and the mucoperiosteum.
   d. Correct. Pain is rarely experienced as the needle advances through the soft tissue between
      the surface mucosa and mucoperiosteum.

   REF: p. 164

18. ANS: c
   a. No more than one eighth, not one half, of an anesthetic cartridge should be deposited
      during needle advancement.
   b. No more than one eighth, not one fourth, of an anesthetic cartridge should be deposited
      during needle advancement.
   c. Correct. Minimal amounts of anesthetic, not to exceed one eighth of a cartridge, may
      be deposited to decrease any discomfort experienced during needle advancement.
   d. Up to one eighth, not one sixteenth, of an anesthetic cartridge may be deposited during
      needle advancement.

   REF: p. 164
19. **ANS:** a
   a. **Correct.** Aspiration is crucial before depositing a volume of anesthetic solution at the target site.
   b. Aspiration is not crucial at this stage of the injection.
   c. Aspiration is not crucial at this stage of the injection; expelling a few drops of anesthetic to facilitate needle advancement requires no aspiration.
   d. Aspiration is not crucial at this stage of the injection; a small amount of anesthetic solution released as the needle moves through tissue poses no serious threat.

   **REF:** p. 164

20. **ANS:** d
   a. The needle touches or comes close to the periosteum in the infraorbital nerve block; anesthetizing the periosteum permits atraumatic contact.
   b. The needle touches the periosteum in the inferior alveolar nerve block; anesthetizing the periosteum permits atraumatic contact.
   c. The needle touches the periosteum in the Gow-Gates mandibular nerve block; anesthetizing the periosteum permits atraumatic contact.
   d. **Correct.** The infraorbital, inferior alveolar, and Gow-Gates mandibular nerve blocks require the needle to approximate or touch the periosteum; the posterior superior alveolar nerve block does not.

   **REF:** p. 164

21. **ANS:** b
   a. Positive aspiration is indicated by the presence of blood within the anesthetic cartridge, not profound anesthesia.
   b. **Correct.** A positive aspiration is identified when blood is drawn into the anesthetic cartridge.
   c. Positive aspiration is *not* indicated by a tingling or burning sensation, but rather by the presence of blood within the anesthetic cartridge.
   d. Dizziness, apprehension, and slurred speech are signs and symptoms associated with mild to moderate overdose levels, not positive aspiration.

   **REF:** p. 165

22. **ANS:** b
   a. The optimal rate of delivery is 60 s for every 1 mL of anesthetic, so approximately 2 minutes are needed for the atraumatic, safe delivery of 1.8 mL.
   b. **Correct.** The optimal rate of delivery for 1.8 mL of anesthetic is approximately 2 minutes.
   c. The optimal rate of delivery is 60 s for every 1 mL of anesthetic, so approximately 2 minutes are needed for the atraumatic, safe delivery of 1.8 mL.
   d. The optimal rate of delivery is 60 s for every 1 mL of anesthetic, so approximately 2 minutes are needed for the atraumatic, safe delivery of 1.8 mL.

   **REF:** p. 166
23. **ANS: d**  
   a. Most adverse reactions associated with the intraoral administration of local anesthesia develop during the injection or within 5–10 minutes of its completion; the patient should not be left unattended after only 30–60 seconds.  
   b. Most adverse reactions associated with the intraoral administration of local anesthesia occur long before 60–90 minutes pass. In fact, most develop during the injection or within 5–10 minutes of its completion.  
   c. Most adverse reactions associated with the intraoral administration of local anesthesia develop during the injection or within 5–10 minutes of its completion; the patient should not be left unattended immediately after the injection.  
   d. **Correct.** Most adverse reactions to local anesthesia occur within 5–10 minutes of its administration.

   **REF:** p. 166

24. **ANS: c**  
   a. This chart entry is almost complete; it is missing the patient’s reaction.  
   b. This chart entry is missing a few elements: the designation as to which PSA was administered, the ratio of epinephrine, and the patient’s reaction.  
   c. **Correct.** This entry represents a complete and correct chart entry; it includes the injection given, the needle used, the local anesthetic drug used, the vasoconstrictor used, the dose in milligrams, and the patient’s reaction.  
   d. This chart entry is missing the needle gauge and the percentage of lidocaine. Although the dose is recorded as a fraction, it should be recorded in milligrams.

   **REF:** p. 167

25. **ANS: b**  
   a. False-negative aspirations do occur; to prevent deposition within a blood vessel, at least two aspirations are required before injecting larger volumes of anesthetic.  
   b. **Correct.** At least two aspirations are performed before the deposition of a larger volume of local anesthetic.  
   c. Two aspirations are performed, before depositing larger volumes of anesthetic. There is nothing wrong with performing three aspirations, but two are required. Several additional aspiration tests are recommended during the injection.  
   d. Two aspirations are performed, before depositing larger volumes of anesthetic. There is nothing wrong with performing four aspirations, but two are required. Several additional aspiration tests are recommended during the injection.

   **REF:** p. 165
Anatomic Considerations

Multiple Choice

1. Managing dental pain requires a sound understanding of which cranial nerve?
   a. IV.
   b. V.
   c. IX.
   d. X.

2. Which statement is true?
   a. The trigeminal nerve is the smallest of the 12 cranial nerves.
   b. The motor root of the trigeminal nerve is larger than the sensory root.
   c. The motor root of the trigeminal nerve innervates the muscles of mastication.
   d. The sensory root of the trigeminal nerve supplies the pharynx and base of tongue.

3. The motor root the trigeminal nerve exits the cranium through which foramen?
   a. Ovale.
   b. Cecum.
   c. Lacerum.
   d. Rotundum.

4. Each, EXCEPT one, is a division of the ophthalmic (V₁) nerve. Which is the EXCEPTION?
   a. Frontal.
   b. Lacrimal.
   c. Zygomatic.
   d. Nasociliary.

5. The maxillary division of the trigeminal nerve (V₂) is
   a. purely motor.
   b. purely sensory.
   c. primarily sensory, but partially motor.
   d. primarily motor, but partially sensory.

6. The maxillary (V₂) nerve innervates the skin in which area?
   a. Forehead.
   b. Upper lip.
   c. Upper eyelid.
   d. Tip of the nose.
7. The maxillary nerve (V2) exits the cranium through which foramen?
   a. Ovale.
   b. Magnum.
   c. Spinosum.
   d. Rotundum.

8. Which branch of the maxillary nerve does NOT originate within the pterygopalatine fossa?
   a. Zygomatic.
   b. Pterygopalatine.
   c. Middle meningeal.
   d. Posterior superior alveolar.

9. The nasopalatine nerve emerges in the oral cavity through which foramen?
   a. Incisive.
   b. Infraorbital.
   c. Lesser palatine.
   d. Greater palatine.

10. The nasopalatine injection blocks sensation to which tissues?
    a. Bilateral palatal mucosa and bone from canine to canine.
    b. Unilateral palatal mucosa and bone from canine to central incisor.
    c. Bilateral palatal mucosa and bone from the canines to the border of the soft palate.
    d. Unilateral palatal mucosa and bone from the canine to the border of the soft palate.

11. The posterior superior alveolar nerve (PSA) usually has
    a. a single trunk.
    b. two branches.
    c. three branches.
    d. four branches.

12. Which nerve innervates the maxillary premolars, in a majority of individuals?
    a. Middle superior alveolar (MSA).
    b. Posterior superior alveolar (PSA).
    c. Anterior superior alveolar (ASA).
    d. Lesser (middle and posterior) palatine.

13. Which nerve block will most likely anesthetize the buccal soft tissues and bone of the premolar area, when the MSA nerve is missing?
    a. Greater (anterior) palatine.
    b. Posterior superior alveolar (PSA).
    c. Anterior superior alveolar (ASA).
    d. Lesser (middle and posterior) palatine.

14. Which nerve innervates the maxillary lateral incisor?
    a. Nasopalatine.
    b. Greater (anterior) palatine.
    c. Middle superior alveolar (MSA).
    d. Anterior superior alveolar (ASA).
15. Dental nerves
   a. terminate within the root furcation.
   b. enter the tooth through the apical foramen.
   c. enter the gingiva to innervate the interdental papillae.
   d. provide sensory innervation to the periodontal ligaments.

16. Which is true in regard to the mandibular division (V₃) of the trigeminal nerve?
   a. V₃ provides purely motor innervation.
   b. V₃ is the largest branch of the trigeminal nerve.
   c. V₃ splits into three divisions, just outside the skull.
   d. V₃ emerges from the cranium through the foramen spinosum.

17. The motor root of the mandibular (V₃) division innervates which?
   a. Tensor veli palatini.
   b. Skin of the lower lip.
   c. Temporomandibular joint.
   d. Mandibular teeth and periodontal tissues.

18. The undivided trunk of the mandibular nerve (V₃) branches to supply the
   a. masseter.
   b. temporalis.
   c. tensor tympani.
   d. pterygoideus lateralis.

19. The buccal nerve innervates which structure?
   a. Lower lip.
   b. Buccinator muscle.
   c. Corner of the mouth.
   d. Buccal gingiva of the mandibular molars.

20. Which nerve is most commonly associated with paresthesia?
   a. Lingual.
   b. Mylohyoid.
   c. Inferior alveolar.
   d. Auriculotemporal.

21. Anesthesia of the inferior alveolar nerve is important for
   a. hard tissue manipulation of the mandibular molars.
   b. hard tissue manipulation of the maxillary premolars.
   c. soft tissue manipulation of the lingual gingiva of the mandible.
   d. soft tissue manipulation of the buccal gingiva adjacent to the mandibular molars.

22. The mylohyoid nerve is least likely to innervate which mandibular tooth?
   a. First molar.
   b. Lateral incisor.
   c. Central incisor.
   d. Second premolar.
23. The mental nerve and incisive nerve are terminal branches of the
   a. inferior alveolar nerve (IA).
   b. middle superior alveolar nerve (MSA).
   c. anterior superior alveolar nerve (ASA).
   d. posterior superior alveolar nerve (PSA).

24. The incisive nerve innervates which?
   a. Skin of the chin.
   b. Mandibular second premolar, and molars.
   c. Skin and mucous membrane of the lower lip.
   d. Mandibular first premolar, canine, and incisors.

25. Which is the largest and strongest facial bone?
   a. Maxilla.
   b. Palatine.
   c. Mandible.
   d. Zygomatic.

Feedback

1. ANS: b
   a. The fourth cranial nerve, the trochlear, innervates the orbit, as opposed to structures
      associated with dental pain.
   b. Correct. A clear understanding of the fifth cranial nerve, the trigeminal, is crucial to the
      professional management of dental pain.
   c. The ninth cranial nerve, the glossopharyngeal, innervates the tongue and pharynx, but
      is less crucial to the management of dental pain.
   d. The tenth cranial nerve, the vagus, provides motor innervation to the trachea, larynx, and
      bronchi, but is less critical to the management of dental pain.

REF: p. 169; Table 12-1

2. ANS: c
   a. The trigeminal nerve is the largest, not smallest, of the 12 cranial nerves.
   b. The sensory root of the trigeminal nerve is larger than the motor root, which is relatively
      small.
   c. Correct. The motor root of the trigeminal nerve innervates the muscles of
      mastication.
   d. The sensory root of the trigeminal nerve innervates all the mucous membrane of the oral
      cavity, except for the pharynx and base of the tongue.

REF: p. 169

3. ANS: a
   a. Correct. The motor root of the trigeminal nerve passes through the foramen ovale along
      with the mandibular division of the sensory root.
   b. The motor root exits the cranium through the foramen ovale, not cecum.
   c. The motor root exits the cranium through the foramen ovale, not lacerum.
   d. The motor root exits the cranium through the foramen ovale, not rotundum.

REF: pp. 169, 172; Figure 12-2
4. ANS: c
   a. The frontal nerve is a main branch of the ophthalmic (V<sub>1</sub>) nerve.
   b. The lacrimal nerve is a main branch of the ophthalmic (V<sub>1</sub>) nerve.
   c. **Correct.** The zygomatic nerve branches off the maxillary (V<sub>2</sub>), not ophthalmic (V<sub>1</sub>) nerve.
   d. The nasociliary nerve is a main branch of the ophthalmic (V<sub>1</sub>) nerve.

REF: pp. 175–176

5. ANS: b
   a. The maxillary division of the trigeminal nerve provides purely sensory, not motor, function.
   b. **Correct.** The maxillary division of the trigeminal nerve serves a purely sensory function.
   c. The maxillary division of the trigeminal nerve provides a purely sensory function; no motor function is present.
   d. The maxillary division of the trigeminal nerve provides a purely sensory function; no motor function is present.

REF: p. 175

6. ANS: b
   a. The frontal nerve, a branch of the ophthalmic nerve (V<sub>1</sub>), innervates the skin of the forehead. The skin of the upper lip is innervated by V<sub>2</sub>.
   b. **Correct.** The terminal branches of the maxillary nerve (V<sub>2</sub>) innervate the skin of the upper lip.
   c. The lacrimal and frontal nerves, branches of the ophthalmic nerve (V<sub>1</sub>), innervate the skin of the upper eyelid. The skin of the upper lip is innervated by V<sub>2</sub>.
   d. The external nasal nerve, a branch of the ophthalmic nerve (V<sub>1</sub>), innervates the skin of the forehead. The skin of the upper lip is innervated by V<sub>2</sub>.

REF: p. 175

7. ANS: d
   a. V<sub>2</sub> exits the cranium via the foramen rotundum, not ovale.
   b. V<sub>2</sub> exits the cranium via the foramen rotundum, not magnum.
   c. V<sub>2</sub> exits the cranium via the foramen rotundum, not spinosum.
   d. **Correct.** The maxillary division (V<sub>2</sub>) of the trigeminal nerve exits the cranium via the foramen rotundum.

REF: p. 173; Figure 12-3, p. 175

8. ANS: c
   a. The zygomatic branch of the maxillary nerve originates in the pterygopalatine fossa.
   b. The pterygopalatine branches of the maxillary nerve originate in the pterygopalatine fossa.
   c. **Correct.** The middle meningeal nerve originates within the cranium, not the pterygopalatine fossa.
   d. The posterior superior alveolar branch of the maxillary nerve originates in the pterygopalatine fossa.

REF: p. 176
9. **ANS:** a
   a. **Correct.** The nasopalatine nerve enters the oral cavity adjacent to the maxillary incisors, through the incisive foramen.
   b. The incisive, not infraorbital, foramen is the portal through which the nasopalatine nerve enters the oral cavity.
   c. The incisive, not lesser palatine, foramen is the portal through which the nasopalatine nerve enters the oral cavity.
   d. The incisive, not greater palatine, foramen is the portal through which the nasopalatine nerve enters the oral cavity.

   **REF:** p. 177

10. **ANS:** a
    a. **Correct.** The nasopalatine nerve block anesthetizes both the right and left nasopalatine nerves as they emerge together through the incisive foramen. Palatal sensation is suspended bilaterally from canine to canine.
    b. Because both the right and left nasopalatine nerves emerge through the incisive foramen, the nasopalatine nerve block will anesthetize the palatal tissues bilaterally, not unilaterally, from canine to canine.
    c. The nasopalatine nerve block will anesthetize the palatal tissues bilaterally from canine to canine. The greater palatine nerve provides unilateral innervation to the posterior portion of the hard palate.
    d. The nasopalatine nerve block will anesthetize the palatal tissues bilaterally from canine to canine. The greater palatine nerve provides unilateral innervation to the posterior portion of the hard palate.

   **REF:** p. 177

11. **ANS:** b
    a. Occasionally the PSA arises with a single trunk, but usually it divides into two branches.
    b. **Correct.** The PSA nerve typically has two branches; one branch travels external to the maxilla bone and one travels internally through the maxilla.
    c. The PSA nerve usually has two, not three, branches.
    d. The PSA nerve typically has two, not four, branches.

   **REF:** p. 178

12. **ANS:** a
    a. **Correct.** In 72% of individuals, the MSA nerve innervates the premolars.
    b. The MSA, not PSA, usually innervates the maxillary premolars. Some individuals do not have an MSA nerve, in which case the ASA and to a lesser degree the PSA nerves innervate the maxillary premolars.
    c. The MSA, not ASA, usually innervates the maxillary premolars. Some individuals do not have an MSA nerve, in which case the ASA and to a lesser degree the PSA nerves innervate the maxillary premolars.
    d. The MSA, not lesser palatine, nerve usually innervates the maxillary premolars.

   **REF:** p. 178
13. ANS: c  
   a. The ASA (and less frequently the PSA), not greater palatine, nerve innervates the buccal soft tissue and bone in the premolar region when the MSA is missing. The greater palatine nerve innervates the palatal tissue and bone in the same region.  
   b. The PSA nerve occasionally innervates the buccal soft tissue and bone in the premolar region when the MSA is missing; however, the ASA innervates the tissues of a missing MSA more frequently.  
   c. **Correct.** When the MSA is missing, the ASA innervates the buccal soft tissue and bone in the premolar area most frequently.  
   d. The ASA (and less frequently the PSA), not lesser palatine, nerve innervates the buccal soft tissue and bone in the premolar region when the MSA is missing.  

REF: p. 178

14. ANS: d  
   a. The ASA nerve innervates the maxillary lateral incisor; the nasopalatine nerve innervates the palatal mucosa and bone of the anterior hard palate.  
   b. The ASA nerve innervates the maxillary lateral incisor; the greater palatine nerve innervates the palatal mucosa and bone of the posterior hard palate.  
   c. The ASA nerve innervates the maxillary lateral incisor; the MSA nerve innervates the maxillary premolars, and occasionally the mesiobuccal root of the first molar.  
   d. **Correct.** The ASA nerve innervates the maxillary lateral incisor.  

REF: p. 178

15. ANS: b  
   a. Interradicular branches emerge from the dental plexus and terminate within the periodontal ligaments of root furcations.  
   b. **Correct.** Dental nerves enter the tooth through the apical foramen to innervate the dental pulp.  
   c. Interdental, or perforating, branches of the dental plexus innervate the interdental papillae.  
   d. Interdental, or perforating, branches of the dental plexus provide sensory innervation to the periodontal ligaments through the alveolar bone.  

REF: p. 179

16. ANS: b  
   a. V3 is a mixed nerve; it provides both motor and sensory innervations.  
   b. **Correct.** V3 is the largest branch of the trigeminal nerve.  
   c. Both roots of the mandibular nerve emerge from the cranium to unite and then split again into two, not three divisions.  
   d. V3 emerges from the cranium through the foramen ovale, not spinosum.  

REF: p. 180
17. ANS: a 
  a. **Correct.** The tensor veli palatini is a muscle innervated by the motor root of V₃.
  b. The sensory, not motor, root of V₃ innervates the skin of the lower lip.
  c. The sensory, not motor, root of V₃ innervates the temporomandibular joint.
  d. The sensory, not motor, root of V₃ innervates the mandibular teeth and periodontal tissues.

REF: pp. 180–181

18. ANS: c 
  a. The masseter muscle is innervated via branches from the anterior division of V₃, not the undivided trunk of V₃.
  b. The temporalis muscle is innervated via branches from the anterior division of V₃, not the undivided trunk of V₃.
  c. **Correct.** Two small branches extend from the undivided portion of the V₃ nerve trunk to supply the dura mater and mastoid air cells, as well as the medial pterygoid, tensor veli palatini, and tensor tympani muscles.
  d. The lateral pterygoid muscle is innervated via branches from the anterior division of V₃, not the undivided trunk of V₃.

REF: p. 181

19. ANS: d 
  a. The buccal nerve does not innervate the lower lip.
  b. The facial, not buccal, nerve innervates the buccinator muscle.
  c. The buccal nerve does not innervate the corner of the mouth.
  d. **Correct.** The buccal nerve innervates the buccal gingiva of the mandibular molars.

REF: pp. 181–182

20. ANS: a 
  a. **Correct.** The lingual nerve is the nerve most commonly associated with paresthesia.
  b. Paresthesia occurs most frequently in association with the lingual, not mylohyoid, nerve.
  c. Paresthesia occurs most frequently in association with the lingual, not inferior alveolar, nerve.
  d. Paresthesia occurs most frequently in association with the lingual, not auriculotemporal, nerve.

REF: p. 182

21. ANS: a 
  a. **Correct.** Anesthesia of the inferior alveolar nerve is required for atraumatic hard tissue manipulation of the mandibular molars.
  b. The inferior alveolar nerve (IA) innervates the mandibular molars; the middle superior alveolar nerve (MSA) innervates the maxillary premolars.
  c. The inferior alveolar nerve (IA) innervates the mandibular molars; the lingual nerve innervates the lingual gingiva of the mandible.
  d. The inferior alveolar nerve (IA) innervates the mandibular molars; the buccal nerve innervates the buccal gingiva adjacent to the mandibular molars.

REF: p. 182
22. ANS: d  
   a. The mylohyoid nerve may innervate portions of the mandibular molars in some individuals.  
   b. The mylohyoid nerve may innervate the mandibular incisors.  
   c. The mylohyoid nerve may innervate the mandibular incisors.  
   d. Correct. No evidence suggests any mylohyoid nerve involvement in the mandibular premolars. The mylohyoid nerve may innervate the mandibular incisors and portions of the mandibular molars in some individuals.

   REF: p. 182

23. ANS: a  
   a. Correct. The IA splits into two terminal branches: the mental nerve and the incisive nerve.  
   b. The mental nerve and incisive nerve are terminal branches of the IA, not MSA.  
   c. The mental nerve and incisive nerve are terminal branches of the IA, not ASA.  
   d. The mental nerve and incisive nerve are terminal branches of the IA, not PSA.

   REF: p. 182

24. ANS: d  
   a. The mental, not incisive, nerve innervates the skin of the chin.  
   b. The inferior alveolar, not incisive, nerve innervates the mandibular posterior teeth.  
   c. The mental, not incisive, nerve innervates the skin and mucous membrane of the lower lip.  
   d. Correct. The incisive nerve innervates the mandibular first premolar, canine, and incisors.

   REF: pp. 182–183

25. ANS: c  
   a. The maxilla is the second largest facial bone, after the mandible.  
   b. The mandible, not palatine, bone is the strongest and largest of the face.  
   c. Correct. The strongest and largest facial bone is the mandible.  
   d. The mandible, not zygomatic, bone is the strongest and largest of the face.

   REF: p. 185
Multiple Choice

1. Which exemplifies a local infiltration?
   a. Local anesthetic is deposited in the interdental papilla to place a matrix band.
   b. Local anesthetic is deposited at the apex of a tooth before restorative treatment.
   c. Local anesthetic is deposited near the main nerve trunk for quadrant extractions.
   d. Local anesthetic is deposited above the apex of a tooth before crown preparation.

2. Which injection technique provides anesthesia for more than one tooth?
   a. Intracrestal.
   b. Intraosseous.
   c. Nasopalatine.
   d. Supraperiosteal.

3. Which technique is used most frequently for pulpal anesthesia in the maxilla?
   a. Maxillary nerve block.
   b. Supraperiosteal injection.
   c. Periodontal ligament injection.
   d. Posterior superior alveolar nerve block.

4. The posterior superior alveolar nerve does NOT consistently innervate which root?
   a. Palatal root of the maxillary third molar.
   b. Mesiobuccal root of the maxillary first molar.
   c. Distobuccal root of the maxillary second molar.
   d. Mesiobuccal root of the maxillary second molar.

5. The supraperiosteal injection is contraindicated for larger areas because
   a. the success rate of this injection is quite low.
   b. the risk of positive aspiration is moderately high.
   c. this particular injection technique is particularly painful.
   d. more anesthetic would be administered than absolutely necessary.

6. Which needle is recommended for the posterior superior alveolar nerve (PSA) block?
   a. 25-gauge short.
   b. 25-gauge long.
   c. 27-gauge short.
   d. 27-gauge long.
7. Which is the correct penetration depth when administering a PSA block to a child?
   a. 10 mm.
   b. 16 mm.
   c. 20 mm.
   d. 25 mm.

8. To safely administer the PSA nerve block
   a. slowly deposit 1.8 mL over 20 to 30 seconds.
   b. aspirate in two planes, and several times during the anesthetic deposition.
   c. guide a long needle into the tissue until 4 mm of the shaft remains visible.
   d. advance the needle upward 4 mm, then inward 4 mm, and finally backward 4 mm.

9. A needle-induced hematoma at the pterygoid plexus of veins
   a. is visible intraorally within several seconds.
   b. is produced by inserting the needle too far laterally.
   c. is typically seen in the buccal tissues of the mandibular region.
   d. is easily controlled when pressure is applied to the injection site.

10. The middle superior alveolar (MSA) nerve is present in which percentage of people?
    a. 8%
    b. 28%
    c. 78%
    d. 98%

11. The success rate of the MSA nerve block is
    a. high.
    b. moderate.
    c. low.
    d. negligible.

12. Which penetration site correlates with the MSA nerve block?
    a. Height of the mucobuccal fold over the maxillary first molar.
    b. Height of the mucobuccal fold over the maxillary second molar.
    c. Height of the mucobuccal fold above the maxillary first premolar.
    d. Height of the mucobuccal fold above the maxillary second premolar.

13. The anterior superior alveolar (ASA) nerve block will NOT anesthetize which?
    a. Upper lip.
    b. Lower eyelid.
    c. Anterior hard palate.
    d. Lateral aspect of the nose.

14. Which foramen is targeted in the ASA nerve block?
    a. Incisive.
    b. Infraorbital.
    c. Lesser palatine.
    d. Greater palatine.
15. The administrator of an ASA nerve block should
   a. feel the anesthetic solution as it is deposited.
   b. feel the needle through the facial skin as it advances toward the target.
   c. see 4 mm of the needle when the correct depth of penetration is reached.
   d. see a visible swelling or ballooning of the tissues during anesthetic deposition.

16. Which is specific to the atraumatic delivery of palatal injections?
   a. Slow deposition.
   b. Topical anesthesia.
   c. Pressure anesthesia.
   d. Syringe stabilization.

17. Which nerve block provides bilateral anesthesia?
   a. Maxillary.
   b. Greater palatine.
   c. Anterior middle superior alveolar.
   d. Palatal approach—anterior superior alveolar.

18. The greater palatine foramen is usually located
   a. mesial to the maxillary first molar.
   b. distal to the maxillary second molar.
   c. distal to the maxillary first premolar.
   d. mesial to the maxillary second premolar.

19. The deposition site of the greater palatine nerve block is attained when
   a. the needle bows slightly from the pressure.
   b. the needle comes in contact with the palatine bone.
   c. the tissues surrounding the penetration site exhibit ischemia.
   d. a small droplet of anesthetic forms against the mucous membrane.

20. Which amount of local anesthetic is deposited for a greater palatine nerve block?
   a. One third of a cartridge.
   b. One half of a cartridge.
   c. Three fourths of a cartridge.
   d. 1 full cartridge.

21. Which sequence of injections leads to an atraumatic nasopalatine nerve block?
   a. Labial frenum, incisive papilla, interproximal papilla.
   b. Interproximal papilla, labial frenum, incisive papilla.
   c. Incisive papilla, labial frenum, interproximal papilla.
   d. Labial frenum, interproximal papilla, incisive papilla.

22. Resistance to the palatal deposition of anesthetic solution is
   a. rare.
   b. normal.
   c. unusual.
   d. intermittent.
23. An infection may trail a nasopalatine nerve block, in which scenario?
   a. The anesthetic solution is deposited too quickly.
   b. The needle tip is inserted directly into the incisive papilla.
   c. The recommended dose of anesthetic solution is exceeded.
   d. The needle is inadvertently advanced into the incisive canal.

24. Following the nasopalatine nerve block, dental treatment can begin within
   a. 1–2 minutes.
   b. 2–3 minutes.
   c. 3–4 minutes.
   d. 4–5 minutes.

25. Which is recommended for the anterior middle superior alveolar (AMSA) nerve block?
   a. Pressure syringe.
   d. Computer-Controlled Local Anesthetic Delivery (C-CLAD).

Feedback

1. ANS: a
   a. Correct. Local infiltrations are deposited directly in the tissue being manipulated, at the small terminal nerve endings.
   b. Field blocks, not local infiltrations, are deposited at the larger terminal branches, and treatment is conducted away from the injection site.
   c. Nerve blocks, not local infiltrations, are deposited near a main nerve trunk, at a considerable distance from the treatment area.
   d. Field blocks, not local infiltrations, are deposited at the larger terminal branches (i.e., at or above the apex of a tooth) of a nerve, and treatment is conducted away from the injection site.

REF: p. 188

2. ANS: c
   a. The intracrestal injection is recommended for anesthesia of a single tooth.
   b. The intraosseous injection is recommended for anesthesia of a single tooth.
   c. Correct. The nasopalatine injection is a nerve block; it anesthetizes a maximum of six maxillary teeth, from canine to canine.
   d. The suprapериosteal injection is recommended for anesthesia of a single tooth.

REF: pp. 188–189
3. ANS: b
   a. The supraperiosteal injection is used for maxillary pulpal anesthesia more frequently than the maxillary nerve block.
   b. Correct. The supraperiosteal injection is used more frequently than any other maxillary technique for pulpal anesthesia.
   c. The supraperiosteal injection is used for maxillary pulpal anesthesia more frequently than the periodontal ligament injection.
   d. The supraperiosteal injection is used for maxillary pulpal anesthesia more frequently than the posterior superior alveolar nerve block.

REF: p. 189

4. ANS: b
   a. The posterior superior alveolar nerve consistently innervates the palatal root of the maxillary third molar.
   b. Correct. The posterior alveolar nerve does not always innervate the mesiobuccal root of the maxillary first molar; in some patients (28%), the middle superior alveolar nerve innervates that root.
   c. The posterior superior alveolar nerve consistently innervates the distobuccal root of the maxillary second molar.
   d. Correct. The posterior superior alveolar nerve consistently innervates the mesiobuccal root of the maxillary second molar.

REF: p. 191

5. ANS: d
   a. The success rate of the supraperiosteal injection is quite high; however, multiple supraperiosteal injections are contraindicated for larger treatment areas, due to the unnecessary increased risk of anesthetic overdose.
   b. The risk of a positive aspiration during the supraperiosteal injection is negligible. Multiple supraperiosteal injections are contraindicated for larger treatment areas, however, due to the unnecessary increased risk of anesthetic overdose.
   c. Supraperiosteal injections are usually very comfortable. Multiple supraperiosteal injections are contraindicated for larger treatment areas, however, due to the unnecessary increased risk of anesthetic overdose.
   d. Correct. Administering several supraperiosteal injections over a larger area will require greater total volumes of local anesthetic than that of a nerve block for the same area.

REF: pp. 189–190

6. ANS: c
   a. A 27-gauge, not 25-gauge, short needle is recommended for the PSA block.
   b. A 27-gauge short, not 25-gauge long, needle is recommended for the PSA block.
   c. Correct. A 27-gauge short needle is recommended for the administration of the posterior superior alveolar nerve block.
   d. A 27-gauge short, not long, needle is recommended for the PSA block.

REF: p. 192
7. ANS: a
   a. **Correct.** The depth of penetration for the PSA block depends on the size of the patient’s skull. For most average adults the depth of penetration is 16 mm; however, for individuals with smaller skulls, like children, the needle is halted at 10–14 mm.
   b. 16 mm is the correct penetration depth for the average adult; in children, the PSA penetration depth is closer to 10 mm.
   c. In children, the penetration depth of the PSA block is 10, not 20, mm. Overinsertion at this depth is likely to elicit a hematoma.
   d. In children, the penetration depth of the PSA block is 10, not 25, mm. Overinsertion at this depth is likely to elicit a hematoma.

REF: p. 194

8. ANS: b
   a. Depositing 1.8 mL in less than 60 s is traumatic and potentially dangerous.
   b. **Correct.** Frequent multiplane aspirations before deposition and during the injection enhance the safety of the PSA block.
   c. Use of a long needle at the penetration depth of 28 mm is potentially dangerous and will likely result in a hematoma.
   d. Advancing the needle in three separate motions is potentially dangerous; the needle must be advanced slowly in one smooth movement.

REF: p. 194

9. ANS: c
   a. A hematoma is visible intraorally within several minutes, not seconds, of penetrating the pterygoid plexus of veins.
   b. Inserting the needle too far posteriorly, not laterally, into the pterygoid plexus of veins produces a hematoma.
   c. **Correct.** A needle-induced hematoma at the pterygoid plexus of veins appears in the buccal tissues of the mandibular region.
   d. A needle-induced hematoma at the pterygoid plexus of veins is not easily controlled; there is no intraoral, or extraoral, site where pressure can be applied to stop the hemorrhage.

REF: p. 195

10. ANS: b
    a. 28%, not 8%, of patients possess an MSA nerve.
    b. **Correct.** 28% of individuals possess an MSA nerve; the anterior superior alveolar nerve usually provides premolar innervation for a majority of the population.
    c. 28%, not 78%, of patients possess an MSA nerve.
    d. 28%, not 98%, of patients possess an MSA nerve.

REF: p. 195
11. **ANS:** a
   a. Correct. The MSA nerve block has a high success rate.
   b. The MSA nerve block is a highly, not moderately, successful technique.
   c. The success rate of the MSA nerve block is high, not low.
   d. The success rate of the MSA nerve block is not negligible, but high.

   **REF:** p. 195

12. **ANS:** d
   a. The needle penetration site of the MSA nerve block lies above the maxillary second premolar, not first molar, at the height of the mucobuccal fold.
   b. The needle penetration site of the MSA nerve block lies above the maxillary second premolar, not second molar, at the height of the mucobuccal fold.
   c. The needle penetration site of the MSA nerve block lies above the maxillary second, not first, premolar at the height of the mucobuccal fold.
   d. Correct. The needle penetrates the mucobuccal fold above the maxillary second premolar for the administration of a MSA nerve block.

   **REF:** p. 195

13. **ANS:** c
   a. The ASA nerve block anesthetizes the upper lip via the superior labial branch of the infraorbital nerve.
   b. The ASA nerve block anesthetizes the lower eyelid via the inferior palpebral branch of the infraorbital nerve.
   c. Correct. The anterior hard palate is anesthetized by the nasopalatine, not ASA, nerve block.
   d. The ASA nerve block anesthetizes the lateral aspect of the nose via the lateral nasal branch of the infraorbital nerve.

   **REF:** pp. 195, 206

14. **ANS:** b
   a. The infraorbital, not incisive, foramen is the target of the ASA nerve block.
   b. Correct. The infraorbital foramen is the target of the ASA nerve block.
   c. The lesser palatine foramen is not the target of the ASA nerve block; the infraorbital foramen is.
   d. The greater palatine foramen is not the target of the ASA nerve block; the infraorbital foramen is.

   **REF:** pp. 197–198
15. ANS: a
a. Correct. The administrator will feel the anesthetic through the finger over the infraorbital foramen, where the solution is being injected.
b. The needle should not be palpable through the skin; the needle should be redirected if its path is too superficial.
c. 16, not 4, mm of a long needle is usually visible at the correct depth of penetration; use of a short needle is not recommended for the ASA block.
d. Swelling or ballooning of the tissues during the deposition of the ASA nerve block should not occur if the needle tip is at the infraorbital foramen.

REF: p. 198

16. ANS: c
a. Slow anesthetic deposition is fundamental to the atraumatic administration of all intraoral injections; pressure anesthesia is unique to palatal techniques.
b. Topical anesthesia of the penetration site is fundamental to the atraumatic administration of all intraoral injections; pressure anesthesia is unique to palatal techniques.
c. Correct. Pressure anesthesia is specific to the palatal injection technique.
d. Syringe stabilization is especially important for palatal injections, but is fundamental to the atraumatic administration of all intraoral injections; pressure anesthesia is unique to palatal techniques.

REF: pp. 220–221

17. ANS: d
a. The maxillary nerve block provides unilateral, not bilateral, anesthesia.
b. The greater palatine nerve block provides unilateral, not bilateral, anesthesia.
c. The anterior MSA nerve block provides unilateral, not bilateral, anesthesia.
d. Correct. The palatal approach—anterior superior alveolar nerve block innervates the anterior branches of the anterior alveolar nerve, as well as the nasopalatine nerve, producing bilateral anesthesia of the anterior hard palate and teeth from canine to canine.

REF: p. 216

18. ANS: b
a. The greater palatine foramen is usually found distal to the maxillary second molar, instead of mesial to the maxillary first molar.
b. Correct. The exact location of the greater palatine foramen varies slightly from person to person, but is usually located just distal to the maxillary second molar.
c. The greater palatine foramen is usually found distal to the maxillary second molar, not first premolar.
d. The greater palatine foramen is usually found distal to the maxillary second molar, instead of mesial to the maxillary second premolar.

REF: pp. 220–221
19. **ANS:** b  
   a. Bowing of the needle does not indicate arrival at the deposition site; rather, the needle contacts the palatal bone when the deposition site is reached.  
   b. **Correct.** The needle comes in gentle contact with the palatal bone when the deposition site of the greater palatine block is reached.  
   c. Tissue ischemia is not an indicator that the needle is at the deposition site; rather the needle will come in contact with the palatal bone.  
   d. The formation of a small droplet of anesthetic against the mucous membrane does not indicate arrival at the deposition site; rather, the needle will come in contact with the palatal bone.  

   **REF:** p. 205

20. **ANS:** a  
   a. **Correct.** No more than one third of a cartridge of anesthetic solution is deposited at the greater palatine nerve.  
   b. One half of a cartridge is too much; no more than one third of a cartridge of anesthetic solution is recommended for the greater palatine nerve block.  
   c. Three fourths of a cartridge is too much; no more than one third of a cartridge of anesthetic solution is recommended for the greater palatine nerve block.  
   d. 1 full cartridge is too much; no more than one third of a cartridge of anesthetic solution is recommended for the greater palatine nerve block.  

   **REF:** p. 205

21. **ANS:** d  
   a. This sequence is incorrect. An atraumatic nasopalatine nerve block is achieved by the following order: labial frenum, interproximal papilla, and incisive papilla.  
   b. This sequence is incorrect. An atraumatic nasopalatine nerve block is achieved by the following order: labial frenum, interproximal papilla, and incisive papilla.  
   c. This sequence is incorrect. An atraumatic nasopalatine nerve block is achieved by the following order: labial frenum, interproximal papilla, and incisive papilla.  
   d. **Correct.** In the multiple injection technique, three injections are used to deliver atraumatic nasopalatine anesthesia; first, an infiltration of the labial frenum, followed by an injection directly into the interproximal papilla between the central incisors. The final injection is into the soft tissues lateral to the incisive papilla.  

   **REF:** pp. 205–206

22. **ANS:** b  
   a. Increased resistance to the deposition of solution is normal, not rare, in palatal anesthesia.  
   b. **Correct.** Resistance to the deposition of anesthetic solution is normal in the palatal tissues due to its highly dense nature.  
   c. Increased resistance to the deposition of solution is normal, not unusual, in palatal anesthesia.  
   d. Increased resistance to the deposition of solution is normal, not intermittent, in palatal anesthesia.  

   **REF:** p. 205
23. ANS: d
   a. Pain, not infection, is the expected consequence of depositing the anesthetic solution too quickly in the nasopalatine nerve block.
   b. Pain, not infection, is the expected consequence of inserting the needle directly into the incisive papilla.
   c. Pain, ischemia, and possible overdose are consequences associated with excessive doses of anesthetic solution in the nasopalatine nerve block; infection is not.
   d. Correct. Infection may follow the nasopalatine nerve block if the needle is inadvertently advanced into the incisive canal to enter the floor of the nose.

REF: p. 208

24. ANS: b
   a. A minimum wait of 2–3 minutes is required before dental treatment begins, following the nasopalatine nerve block.
   b. Correct. Dental treatment can commence 2–3 minutes from the completion of the nasopalatine nerve block.
   c. Dental treatment can commence 2–3 minutes from the completion of the nasopalatine nerve block.
   d. Dental treatment can commence 2–3 minutes from the completion of the nasopalatine nerve block.

REF: p. 210

25. ANS: d
   a. A pressure syringe is not recommended for the delivery of the AMSA block; a C-CLAD is.
   b. A jet injector syringe is not recommended for the delivery of the AMSA block; a C-CLAD is.
   c. A conventional self-aspirating syringe can safely deliver the AMSA block, but a C-CLAD is recommended because it improves the ease and comfort of the injection.
   d. Correct. A C-CLAD system is recommended for the delivery of the AMSA block.

REF: p. 212
CHAPTER 14

Techniques of Mandibular Anesthesia

Multiple Choice

1. Profound maxillary anesthesia is more difficult to achieve than profound mandibular anesthesia, because the maxillary cortical plate is rather thin.
   a. Both the statement and the reason are correct and related.
   b. Both the statement and the reason are correct but not related.
   c. The statement is correct, but the reason is not.
   d. The statement is not correct, but the reason is correct.

2. The success rate of mandibular anesthesia is NOT attributed to which factor?
   a. Absence of consistent landmarks.
   b. Need for multiple needle insertions.
   c. Presence of a thick mandibular cortical plate.
   d. Inability to anesthetize the core fibers of the nerve.

3. Which mandibular nerve block is most likely to succeed?
   a. Buccal.
   b. Incisive.
   c. Gow-Gates.
   d. Inferior alveolar.

4. The Vazirani-Akinosi nerve block is uniquely helpful in which scenario?
   a. The patient is unable to open her mouth more than a few millimeters.
   b. The patient has a history of unsuccessful inferior alveolar nerve blocks.
   c. The patient is scheduled for three procedures, all within the same quadrant.
   d. The patient’s treatment plan involves the right and left mandibular incisors.

5. Which supplemental technique is used to rectify partial anesthesia of a lower incisor, following the administration of an otherwise successful inferior alveolar nerve block?
   a. Intraosseous anesthesia.
   b. Supraperiosteal injection.
   c. Periodontal ligament injection.
   d. Contralateral inferior alveolar nerve block.

6. The inferior alveolar nerve block
   a. is also known as the buccinator nerve block.
   b. has the highest incidence of positive aspiration.
   c. has a 95% success rate in producing profound anesthesia.
   d. is administered with the use of a 25- or 27-gauge short needle.
7. A right-handed operator sits in which position to administer a left inferior alveolar nerve block (IANB)?
   a. 8 o’clock.
   b. 9 o’clock.
   c. 10 o’clock.
   d. 11 o’clock.

8. In most patients, the height of the inferior alveolar injection lies
   a. 1–3 mm above the occlusal plane.
   b. 3–6 mm above the occlusal plane.
   c. 6–10 mm above the occlusal plane.
   d. 10–12 mm above the occlusal plane.

9. How much of the needle is visible during the deposition of the IANB?
   a. One third.
   b. One half.
   c. Two thirds.
   d. Three fourths.

10. Which amount of anesthetic is deposited at the inferior alveolar nerve?
    a. 1.8 mL.
    b. 1.5 mL.
    c. 1.2 mL.
    d. 1.0 mL.

11. Facial paralysis may develop in connection with the IANB if
    a. the bone is contacted too forcefully.
    b. anesthetic is deposited without bony contact.
    c. the needle comes in contact with the bone too soon.
    d. anesthetic is deposited too far below the mandibular foramen.

12. Which complication is extremely common, after the dissipation of the IANB?
    a. Hematoma.
    b. Mild trismus.
    c. Blepharoptosis.
    d. Facial paralysis.

13. Anesthesia of the buccal nerve is contraindicated for which procedure?
    a. Placing a matrix band around the mandibular third molar.
    b. Restoring a carious cavitation in the second mandibular molar.
    c. Placing a rubber dam clamp around the second mandibular molar.
    d. Scaling subgingival calculus deposits from the first mandibular molar.

14. The penetration site of the buccal nerve block is
    a. distal and buccal to the last molar.
    b. distal and lingual to the last molar.
    c. mesial and buccal to the last molar.
    d. mesial and lingual to the last molar.
15. Bone is gently contacted in each injection, EXCEPT one. Which is the EXCEPTION?
   a. Buccal nerve block.
   b. Inferior alveolar nerve block.
   c. Gow-Gates mandibular nerve block.
   d. Vazirani-Akinosi mandibular nerve block.

16. The bevel of the needle in the buccal nerve block is positioned toward the
   a. bone.
   b. cheek.
   c. tongue.
   d. occlusion.

17. Which disadvantage is attributed to the Gow-Gates mandibular nerve block?
   a. Low success rate.
   b. High incidence of positive aspiration.
   c. Hesitancy on the part of the operator to learn the technique.
   d. Partial anesthesia related to unanesthetized accessory innervations.

18. The onset of anesthesia, following a Gow-Gates mandibular block, is anticipated within
   a. 2 minutes.
   b. 3 minutes.
   c. 4 minutes.
   d. 5 minutes.

19. Which needle is recommended for a Vazirani-Akinosi mandibular nerve block?
   a. 25-gauge short.
   b. 27-gauge short.
   c. 25-gauge long.
   d. 27-gauge long.

20. Which intraoral landmark guides the Gow-Gates mandibular block?
   a. Coronoid notch.
   b. Most posterior mandibular molar.
   c. Mesiolingual cusp of the maxillary second molar.
   d. Mucogingival junction of the maxillary second or third molar.

21. After administering the Gow-Gates mandibular nerve block (GGMNB)
   a. ask the patient keep his or her mouth open for 1–2 minutes.
   b. lower the patient from the supine to the Trendelenburg position.
   c. wait at least 10 minutes before commencing the dental procedure.
   d. maintain gentle finger pressure directly over the injection site for 2 minutes.

22. In the Vazirani-Akinosi technique, the bevel of the needle is positioned away from the
   a. midline, toward the bone.
   b. bone, toward the midline.
   c. floor of the mouth, toward the palate.
   d. palate, toward the floor of the mouth.
23. To correctly administer the mental nerve block, the patient’s mouth is which?
   a. Wide open.
   b. Partially closed.
   c. Comfortably open.
   d. Completely closed.

24. The incisive nerve block does NOT anesthetize which tooth?
   a. Molar.
   b. Incisor.
   c. Canine.
   d. Premolar.

25. Which facilitates a successful incisive nerve block?
   a. The needle must gently penetrate the mental foramen.
   b. The bevel of the needle must be positioned away from the bone.
   c. The operator must deposit one fourth of the anesthetic cartridge.
   d. The operator must apply gentle finger pressure over the injection site.

**Feedback**

1. **ANS: d**
   a. The statement is not correct; profound maxillary anesthesia is less, not more, difficult to achieve than profound mandibular anesthesia.
   b. The statement is not correct; profound maxillary anesthesia is less, not more, difficult to achieve than profound mandibular anesthesia.
   c. The statement is not correct; profound maxillary anesthesia is less, not more, difficult to achieve than profound mandibular anesthesia. The reason is correct; the maxillary cortical plate is rather thin, enabling a higher success rate for maxillary anesthesia.
   d. Correct. The statement is not correct; profound maxillary anesthesia is not more, but less, difficult to achieve compared with mandibular local anesthesia. The reason is correct; the rather thin nature of the maxillary cortical plate contributes to the high success rate of maxillary anesthesia.

REF: p. 225

2. **ANS: b**
   a. The absence of consistent, recognizable landmarks is a difficulty associated with the low success rate of mandibular anesthesia.
   b. Correct. The effect of multiple needle insertions is important to consider when administering multiple supraperiosteal injections, a procedure that is not recommended for mandibular anesthesia.
   c. The presence of a thick mandibular cortical plate is a challenge associated with the low success rate of mandibular anesthesia.
   d. An inability to adequately anesthetize the core fibers of the inferior alveolar nerve is a difficulty associated with the low success rate of mandibular anesthesia.

REF: p. 225
3. **ANS: a**
   a. **Correct.** The buccal nerve block has a success rate that approaches 100%, primarily because the nerve is not encased in bone but lies directly beneath the soft tissues.
   b. Although typically a successful injection, the buccal nerve block is more likely to succeed than the incisive nerve block.
   c. The buccal nerve block is more likely to succeed (100% success rate) than the Gow-Gates mandibular block (95% success rate).
   d. The buccal nerve block is more likely to succeed than the inferior alveolar nerve block, which is less likely than most other nerve blocks to succeed.

   **REF:** pp. 225, 233

4. **ANS: a**
   a. **Correct.** The Vazirani-Akinosi nerve block is a unique technique, because it requires a closed, not open, jaw. This technique is distinctively helpful in cases where the patient is unable to open the jaw.
   b. The Vazirani-Akinosi nerve block can successfully substitute for the inferior alveolar nerve block, but so can the Gow-Gates mandibular nerve block, which has a higher rate of success. The Vazirani-Akinosi nerve block is 80% successful in cases of restricted mandibular opening, a scenario in which the inferior alveolar and Gow-Gates mandibular nerve blocks are almost certain to fail.
   c. The Vazirani-Akinosi nerve block is not particularly helpful to quadrant dentistry; it is, however, uniquely suited to cases involving restricted mandibular opening.
   d. The Vazirani-Akinosi nerve block is not particularly helpful when bilateral restorative treatment is restricted to the anterior incisors; bilateral incisive nerve blocks are uniquely helpful in this scenario.

   **REF:** pp. 226, 240–241

5. **ANS: b**
   a. Intraosseous anesthesia is used when mandibular molar anesthesia is elusive, after the inferior alveolar nerve block. A supraperiosteal injection for the unresponsive incisor is recommended.
   b. **Correct.** The supraperiosteal injection is a useful and effective technique used to supplement the inferior alveolar nerve block, when it fails to completely anesthetize a lower incisor.
   c. The PDL injection is used when partial anesthesia of a mandibular molar, not incisor, occurs. In fact, the PDL injection is seldom used where a supraperiosteal injection is highly effective and atraumatic.
   d. The administration of the contralateral inferior alveolar nerve block is discouraged, as it will produce bilateral mandibular anesthesia; a simple supraperiosteal injection is recommended.

   **REF:** p. 226
6. ANS: b
   a. The buccal, not inferior alveolar, nerve block is also known as the buccinator nerve block.
   b. Correct. The inferior alveolar nerve block has the highest incidence of positive aspiration (10% to 15%) among all intraoral injection techniques.
   c. The Gow-Gates mandibular nerve block has a 95% success rate among experienced professionals; the inferior alveolar nerve block is only 19% to 69% successful in producing profound mandibular anesthesia.
   d. The inferior alveolar nerve block is administered with the use of a 25-gauge long, not short, needle.

REF: p. 227

7. ANS: c
   a. The 8 o'clock operator position is recommended when administering a right, not left, IANB, provided the operator is right-handed.
   b. The 10 o'clock, not 9 o'clock, operator position is recommended when administering the left IANB, provided the operator is right-handed.
   c. Correct. The 10 o'clock operator position is recommended for best visualization and administration of a left IANB, provided the operator is right-handed.
   d. The 10 o'clock, not 11 o'clock, operator position is recommended when administering the left IANB, provided the operator is right-handed.

REF: p. 228

8. ANS: c
   a. The height of the injection, for an inferior alveolar nerve block, is nearly 6 to 10, not 1 to 3, mm above the occlusal plane.
   b. The height of the injection, for an inferior alveolar nerve block, is nearly 6 to 10, not 3 to 6, mm above the occlusal plane.
   c. Correct. When administering an inferior alveolar nerve block, the average height of the injection is approximately 6–10 mm above the occlusal plane.
   d. The height of the injection, for an inferior alveolar nerve block, is approximately 6 to 10, not 10 to 12, mm above the occlusal plane.

REF: p. 229

9. ANS: a
   a. Correct. One third to one fourth of the needle shaft is visible when the operator has reached the penetration depth of the IANB.
   b. The penetration depth is unlikely to have been reached, if one half of a long needle is still visible in the mouth; the average depth of penetration is reached when two thirds to three fourths of the needle is buried in soft tissue, leaving one third to one fourth visible.
   c. The penetration depth is unlikely to have been reached, if two thirds of a long needle is still visible in the mouth; the average depth of penetration is reached when two thirds to three fourths of the needle is buried in soft tissue, leaving one third to one fourth visible.
   d. The penetration depth is unlikely to have been reached, if three fourths of a long needle is still visible in the mouth; the average depth of penetration is reached when two thirds to three fourths of the needle is buried in soft tissue, leaving one third to one fourth visible.

REF: p. 230
10. ANS: b  
   a. The IANB requires 1.5, not 1.8, mL, of anesthetic for profound anesthesia. When the lingual nerve requires anesthesia, the remaining 0.2 mL is deposited at the lingual nerve.  
   b. Correct. 1.5 mL of local anesthetic is deposited at the inferior alveolar nerve.  
   c. The IANB requires 1.5, not 1.2, mL of anesthetic for profound anesthesia.  
   d. The IANB requires 1.5, not 1.0, mL of anesthetic for profound anesthesia.  

REF: p. 231

11. ANS: b  
   a. The development of facial paralysis following an IANB is an indication that bony contact was not made before deposition. Pain, not paralysis, results if the bone is contacted too forcefully.  
   b. Correct. Facial paralysis is a possible consequence of depositing anesthetic without first making bony contact. The needle tip, in this scenario, is instead resting within the parotid gland, near the facial nerve.  
   c. The development of facial paralysis following an IANB is an indication that bony contact was not made before deposition. Early bony contact is an indication that the needle tip is located too far anteriorly on the ramus.  
   d. The development of facial paralysis following an IANB is an indication that bony contact was not made before deposition. Failure to elicit profound anesthesia may result when anesthetic is deposited too far below the mandibular foramen.  

REF: p. 231

12. ANS: b  
   a. Hematoma is a rare complication associated with the IANB; mild trismus is extremely common.  
   b. Correct. Mild trismus (slight soreness when opening the jaw) is an extremely common complication after the dissipation of the IANB. Severe trismus is rare.  
   c. Blepharoptosis (drooping upper eyelid) is a rare complication associated with the Gow-Gates mandibular block, not the IANB.  
   d. Mild trismus is an extremely common complication after the dissipation of the IANB; transient facial paralysis is not.  

REF: p. 233

13. ANS: b  
   a. The buccal nerve block is indicated for the atraumatic placement of a matrix band around a mandibular molar.  
   b. Correct. The buccal nerve block is contraindicated for restorative procedures, which do not require the manipulation of the buccal soft tissues adjacent to the mandibular molars.  
   c. The buccal nerve block is indicated for the placement of a rubber dam, when the mandibular molars are involved.  
   d. The buccal nerve block is indicated for the scaling of subgingival calculus deposits, when the buccal aspect of a mandibular molar is involved.  

REF: p. 233
14. ANS: a
   a. Correct. The penetration site of the buccal nerve block is distal and buccal to the last molar.
   b. The penetration site of the buccal nerve block is distal and buccal, not lingual, to the most posterior molar.
   c. The penetration site of the buccal nerve block is distal, not mesial, and buccal to the most posterior molar.
   d. The penetration site of the buccal nerve block is distal and buccal, not mesial and lingual, to the most posterior molar.

REF: p. 234

15. ANS: d
   a. The mucoperiosteum is gently contacted in the buccal nerve block.
   b. The ramus of the mandible is gently contacted in the IANB.
   c. The neck of the mandibular condyle is gently contacted in the GGMNB.
   d. Correct. No bone is contacted in the Vazirani-Akinosi mandibular nerve block.

REF: p. 300

16. ANS: a
   a. Correct. The needle’s bevel is positioned toward the bone (anterior border of the ramus) for the buccal nerve block.
   b. When administering a buccal nerve block, the bevel of the needle should be positioned toward the bone, not cheek.
   c. When administering a buccal nerve block, the bevel of the needle should be positioned toward the bone, not tongue.
   d. When administering a buccal nerve block, the bevel of the needle should be positioned toward the bone, not occlusion.

REF: p. 234

17. ANS: c
   a. The Gow-Gates mandibular nerve block has a high, not low, success rate if administered correctly.
   b. The Gow-Gates mandibular nerve block has a fairly low incidence of positive aspiration (approximately 2%).
   c. Correct. The main disadvantage of the Gow-Gates mandibular nerve block is hesitancy on the part of the administrator to learn the technique and gain clinical experience with it.
   d. Partial anesthesia of the mandible due to accessory innervation is a problem that is nearly eliminated with the Gow-Gates mandibular nerve block.

REF: p. 237
18. **ANS: d**
   a. A minimum of 5, not 2, minutes is requisite for the onset of profound anesthesia following the administration of the Gow-Gates mandibular block.
   b. A minimum of 5, not 3, minutes is requisite for the onset of profound anesthesia following the administration of the Gow-Gates mandibular block.
   c. A minimum of 5, not 4, minutes is requisite for the onset of profound anesthesia following the administration of the Gow-Gates mandibular block.
   d. Correct. The onset of anesthesia, following a Gow-Gates mandibular block, occurs within 5 minutes. This slightly delayed onset is primarily attributed to the nerve trunk size and the distance of the nerve trunk from the deposition site.

   **REF:** p. 240

19. **ANS: c**
   a. A 25-gauge long, not short, needle is best suited for the administration of a Vazirani-Akinosi mandibular block.
   b. A 25-gauge long needle is best suited for the administration of a Vazirani-Akinosi mandibular block, as opposed to a 27-gauge short needle.
   c. Correct. A 25-gauge long needle is recommended for the administration of a Vazirani-Akinosi mandibular block.
   d. A 25-gauge long needle is recommended for the administration of a Vazirani-Akinosi mandibular block; however, a 27-gauge long needle can be used if the patient’s ramus is particularly flared.

   **REF:** p. 242

20. **ANS: c**
   a. The coronoid notch is a landmark for the inferior alveolar, not Gow-Gates mandibular, nerve block.
   b. The most posterior mandibular molar is a landmark for the buccal, not Gow-Gates mandibular, nerve block.
   c. Correct. The mesiolingual cusp of the maxillary second molar is a landmark for the Gow-Gates mandibular nerve block.
   d. The mucogingival junction of the maxillary second or third molar is a landmark for the Vazirani-Akinosi, not Gow-Gates, mandibular nerve block.

   **REF:** pp. 237–238

21. **ANS: a**
   a. Correct. After administering the GGMNB, ask the patient to keep his or her mouth open for 1–2 minutes to facilitate the diffusion of the anesthetic.
   b. After the completion of the GGMNB, raise the patient from the supine to the upright position.
   c. Wait at least 5, not 10, minutes before commencing the dental procedure at the completion of the GGMNB.
   d. After administering the incisive, not Gow-Gates mandibular, nerve block, maintain gentle finger pressure over the injection site.

   **REF:** p. 238
22. ANS: b
   a. The needle bevel faces the midline, not the bone, in the Vazirani-Akinosi mandibular nerve block.
   b. Correct. The bevel of the needle is positioned away from the bone of the mandibular ramus, and toward the midline in the Vazirani-Akinosi technique.
   c. The needle bevel faces the midline, not the palate, in the Vazirani-Akinosi mandibular nerve block.
   d. The needle bevel faces the midline, not the floor of the mouth, in the Vazirani-Akinosi mandibular nerve block.

   REF: pp. 243–244; Figure 14-25

23. ANS: b
   a. The Gow-Gates mandibular nerve block requires the patient to open his or her mouth wide; a partially closed mouth is better suited to the mental nerve block.
   b. Correct. Greater access to the injection site is enabled when the patient’s mouth is partially closed for the mental nerve block.
   c. The inferior alveolar nerve block requires the patient to open his or her mouth comfortably; a partially closed mouth is better suited to the mental nerve block.
   d. The patient’s mouth is completely closed for the Vazirani-Akinosi mandibular nerve block; a partially closed mouth is better suited to the mental nerve block.

   REF: pp. 245–246

24. ANS: a
   a. Correct. The mandibular molars are not anesthetized by the incisive nerve block.
   b. The incisive nerve innervates the mandibular central and lateral incisors, but not the molars.
   c. The incisive nerve innervates the mandibular canine, but not the molars.
   d. The incisive nerve innervates the mandibular premolars, but not the molars.

   REF: p. 247

25. ANS: d
   a. The needle does not need to enter the mental foramen for a successful incisive nerve block; in fact, penetrating the mental foramen with a sharp needle may damage the nerve.
   b. The bevel of the needle must be positioned toward, not away from the bone for a successful incisive nerve block.
   c. The operator must deposit one third, not one fourth, of a cartridge for a successful incisive nerve block.
   d. Correct. The operator must apply gentle finger pressure over the injection site during and after the injection to facilitate a successful incisive nerve block.

   REF: p. 248
Multiple Choice

1. Each is deposited into cancellous bone, EXCEPT one. Which is the EXCEPTION?
   a. Intraseptal injection.
   b. Intrapulpal injection.
   c. Periodontal ligament injection.
   d. Single tooth anesthesia (STA)—intraligamentary injection.

2. The periodontal ligament injection with a traditional syringe is contraindicated in which case?
   a. Mandibular pain requires localization for diagnosis.
   b. One or two primary teeth in a quadrant require anesthesia.
   c. Isolated permanent teeth in contralateral quadrants require anesthesia.
   d. Patient with hemophilia requires restorative treatment of a mandibular molar.

3. Which is the most common periodontal ligament (PDL) postinjection complication?
   a. Sloughing and crestal bone exposure.
   b. Prolonged ischemia of the interdental papilla.
   c. Swelling and discoloration at the injection site.
   d. Mild discomfort and sensitivity to biting and percussion.

4. Pressure syringes are highly recommended for the routine administration of the periodontal ligament injection. A conventional syringe is used only when the operator is unable to achieve adequate anesthesia with a pressure syringe.
   a. Both statements are true.
   b. Both statements are false.
   c. The first statement is true; the second is false.
   d. The first statement is false; the second is true.

5. Profound pulpal and soft tissue anesthesia occurs within
   a. 30 seconds of the PDL injection.
   b. 60 seconds of the PDL injection.
   c. 1–2 minutes of the PDL injection.
   d. 2–3 minutes of the PDL injection.

6. Which amount of anesthetic is required to anesthetize a bi-rooted mandibular molar with PDL injections?
   a. 0.2 mL.
   b. 0.4 mL.
   c. 0.6 mL.
   d. 0.8 mL.
7. Which indicates the success of a PDL injection?
   a. Local anesthetic flows back into the oral cavity.
   b. The deposition of anesthetic solution is effortless.
   c. The tissues around the injection site are ischemic.
   d. No response to electrical pulp testing at 50/80 output.

8. When the needle tip of the STA computer-controlled local anesthetic delivery (C-CLAD) system reaches the optimal position for a PDL injection, which indicator light is lit?
   a. Red.
   b. Green.
   c. Yellow.
   d. Orange.

9. Which device provides the most safe, predictable, and comfortable PDL injection?
   a. Comfort Control Syringe system.
   b. Pistol-grip high-pressure syringe.
   c. STA system with dynamic pressure-sensing (DPA) technology.
   d. Manually driven conventional syringe.

10. The likelihood of positive aspiration during intraseptal injection is
    a. 0%
    b. 2%
    c. 5%
    d. 10%

11. The needle is inserted in which area, for an intraseptal injection?
    a. 2 mm below the tip of the papillary triangle.
    b. 1 mm above the base of the papillary triangle.
    c. At the tip of the papillary triangle.
    d. At the mucogingival junction, equidistant from adjacent teeth.

12. Which defines the correct deposition of the intraseptal injection?
    a. Deposit 0.2 to 0.4 mL of local anesthetic in not less than 20 s.
    b. Deposit 0.45 to 0.6 mL of local anesthetic in not less than 10 s.
    c. Deposit 0.9 to 1.35 mL of local anesthetic in not less than 30 s.
    d. Deposit 1.35 to 1.8 mL of local anesthetic in not less than 40 s.

13. At the site of intraseptal deposition, the tip of the needle is located
    a. 1–2 mm within the interdental septum.
    b. at the bony surface of the interdental septum.
    c. 1–2 mm from the surface of the interdental septum.
    d. within 3–5 mm of the surface of the interdental septum.

14. Which needle length is used with the X-Tip System for intraosseous injection?
    a. 8 mm.
    b. 10 mm.
    c. 20 mm.
    d. 32 mm.
15. Which component of the IntraFlow handpiece channels the local anesthetic to the needle?
   a. Drill.
   b. Latch tip.
   c. Transfuser.
   d. Infusion drive.

16. “Plain” local anesthetics are recommended for intraosseous injections because vasopressor-containing solutions elicit cardiac palpitations.
   a. Neither the statement nor the reason is correct.
   b. The statement is correct, but the reason is not.
   c. The statement is not correct, but the reason is correct.
   d. Both the statement and reason are correct and related.

17. Which safety precaution is advised for an intraosseous injection?
   a. Inject the anesthetic slowly.
   b. Use a vasopressor-containing anesthetic.
   c. Aspirate frequently during the deposition.
   d. Apply antiseptic before injecting into infected tissue.

18. Postinjection pain after intraosseous anesthesia is
   a. anticipated.
   b. common.
   c. unlikely.
   d. rare.

19. Intraosseous anesthesia is expected to last between
   a. 10 and 15 minutes.
   b. 15 and 30 minutes.
   c. 30 and 60 minutes.
   d. 60 and 90 minutes.

20. Intrapulpal anesthesia is particularly useful for which tooth?
   a. Maxillary canine.
   b. Mandibular molar.
   c. Mandibular incisor.
   d. Maxillary premolar.

21. Which statement is true?
   a. The intrapulpal injection is traumatic.
   b. The intrapulpal injection anesthetizes the tooth and associated gingiva.
   c. Dental treatment can commence immediately after the intrapulpal injection.
   d. When a needle breaks in the pulp chamber, retrieval of the needle tip is difficult.

22. The intrapulpal injection produces optimal results in which difficult case?
   a. Large areas of decay.
   b. Deep, cavitated pit.
   c. Inflamed pulp tissue.
   d. Pulp canal blockage.
23. Which local anesthetic is recommended for mandibular infiltration?
   a. Articaine 4%.
   b. Lidocaine 2%.
   c. Prilocaine 4%.
   d. Mepivacaine 2%.

24. A split dose of anesthetic, buccal and lingual injections, is recommended for the infiltration of which mandibular tooth?
   a. Molar.
   b. Incisor.
   c. Canine.
   d. Premolar.

25. Which electrical pulp test confirms profound anesthesia?
   a. One conclusive electrical pulp tester (EPT) reading at 60 µA.
   b. One conclusive EPT reading at 80 µA.
   c. Two consecutive EPT readings at 60 µA, 2–3 minutes apart.
   d. Two consecutive EPT readings at 80 µA, 2 or 3 minutes apart.

Feedback

1. ANS: b
   a. Intraseptal injections involve the deposition of local anesthetic into the supportive cancellous bone.
   b. Correct. Intrapulpal injections are deposited directly into the coronal pulp chamber of a tooth, as opposed to intraosseous injections, which are deposited into the cancellous bone that supports the teeth.
   c. Periodontal ligament injections involve the deposition of local anesthetic into the supportive cancellous bone.
   d. Single tooth anesthesia—intraligamentary injections involve the deposition of local anesthetic into the supportive cancellous bone.

REF: pp. 253, 269

2. ANS: b
   a. The periodontal ligament injection is indicated for localizing mandibular pain during diagnosis.
   b. Correct. The periodontal ligament injection is contraindicated in the primary dentition; the development of enamel hypoplasia or hypomineralization is, in some cases, linked to the administration of the periodontal ligament injection.
   c. The periodontal ligament injection is indicated when two isolated teeth in contralateral quadrants require anesthesia; bilateral mandibular anesthesia is strongly discouraged.
   d. Periodontal ligament injections are indicated in special cases, where block anesthesia is contraindicated, as in patients with hemophilia.

REF: p. 254
3. ANS: d
   a. Sloughing and crestal bone exposure may occur when the PDL injection is poorly administered; however, these are not the most common complications; mild discomfort and sensitivity to percussion are experienced most frequently.
   b. Prolonged ischemia of the interdental papilla may occur when the PDL injection is poorly administered; however, this is not the most common complication; mild discomfort and sensitivity to percussion are experienced most frequently.
   c. Swelling and discoloration may occur when the PDL injection is poorly administered; however, these are not the most common complications; mild discomfort and sensitivity to percussion are experienced most frequently.
   d. Correct. The most common complication associated with the PDL injection is mild discomfort and sensitivity to biting and percussion.

REF: p. 255

4. ANS: b
   a. Both statements are false, not true.
   b. Correct. Both statements are false. Pressure syringes are not recommended for the routine administration of the PDL injection, but are helpful when adequate anesthesia with a conventional syringe proves elusive.
   c. The first statement is false. A conventional, not pressure syringe is recommended for the routine administration of the PDL injection.
   d. The second statement is false. A pressure syringe should be used only when the operator is unable to achieve adequate anesthesia with a conventional syringe.

REF: p. 255

5. ANS: a
   a. Correct. The onset of profound pulpal and soft tissue anesthesia occurs approximately 30 seconds after a successful PDL injection.
   b. Rapid onset of action is an advantage associated with the PDL injection; profound local anesthesia occurs 30, not 60, seconds after completion.
   c. Rapid onset of action is an advantage associated with the PDL injection; profound local anesthesia occurs 30 seconds, not 1–2 minutes, after completion.
   d. Rapid onset of action is an advantage associated with the PDL injection; profound local anesthesia occurs 30 seconds, not 2–3 minutes, after completion.

REF: p. 256

6. ANS: b
   a. Each root of a tooth requires 0.2 mL of anesthetic solution to completely anesthetize the tooth via PDL injections; a bi-rooted tooth requires 0.4 mL.
   b. Correct. A mandibular molar has two roots, and each will require 0.2 mL of anesthetic solution to completely anesthetize the tooth; the total amount of anesthetic required is 0.4 mL.
   c. Each root of a tooth requires 0.2 mL of anesthetic solution to completely anesthetize the tooth via PDL injections; a bi-rooted tooth requires 0.4 mL.
   d. Each root of a tooth requires 0.2 mL of anesthetic solution to completely anesthetize the tooth via PDL injections; a bi-rooted tooth requires 0.4 mL.

REF: p. 257
7. ANS: c  
   a. Backflow of anesthetic solution is an indication that the needle must be repositioned and  
      the injection administered again to achieve success.
   b. Effortless deposition of a PDL injection is an indication of incorrect positioning; signifi-  
      cant resistance is a sign of success.
   c. Correct. Ischemia of adjacent tissues is a sign of PDL injection success.
   d. The objective indicator of PDL injection success is negative pulpal response to electrical  
      pulp testing at maximum output: 80/80, not 50/80.

REF: p. 257

8. ANS: b  
   a. A green STA system light signals optimal needle position for the PDL injection. Red  
      indicates the pressure is too low to be in the correct location.
   b. Correct. A green LED light signals the optimal positioning of the STA needle tip for a  
      PDL injection.
   c. Dark yellow STA lights indicate increasing pressure, while light yellow may indicate  
      correct needle positioning for the PDL injection; however, a green LED light is indicative  
      of optimal needle positioning.
   d. A green STA system light signals optimal needle position for the PDL injection. Orange  
      indicates the pressure is increasing, but still too low to be in the correct location.

REF: p. 259; Figure 15-6

9. ANS: c  
   a. The STA system is believed to provide benefits that cannot be achieved with the use of  
      the Comfort Control Syringe and other C-CLAD instruments.
   b. The STA system is believed to provide benefits that cannot be achieved with the use of  
      the pistol-grip high-pressure syringe.
   c. Correct. The STA system with DPS technology provides the safest, most predictable  
      and comfortable delivery of local anesthetic.
   d. The STA system is believed to provide benefits that cannot be achieved with the use of  
      a traditional manual dental syringe.

REF: p. 260

10. ANS: a  
    a. Correct. One distinct advantage of the intraseptal injection is the 0% likelihood of posi-  
        tive aspiration.
    b. Intravascular injection is unlikely to occur with the intraseptal injection; positive aspira-  
        tion occurs 0%, not 2%, of the time.
    c. Intravascular injection is unlikely to occur with the intraseptal injection; positive aspira-  
        tion occurs 0%, not 5%, of the time.
    d. Intravascular injection is unlikely to occur with the intraseptal injection; positive aspira-  
        tion occurs 0%, not 10%, of the time.

REF: p. 263

http://dentalebooks.com
11. **ANS**: a
   a. Correct. The area of insertion for an intraseptal injection lies 2 mm below the tip of the papillary triangle, in the center of the interdental papilla.
   b. The intraseptal injection requires needle insertion 2 mm below the tip of the papillary triangle, as opposed to 1 mm above the base of the papillary triangle.
   c. The correct point of needle insertion for the intraseptal injection is 2 mm below, not at the tip of, the papillary triangle.
   d. The intraseptal injection requires needle insertion in the center of the interdental papilla, not mucogingival junction, equidistant from adjacent teeth.

   **REF**: p. 263

12. **ANS**: a
   a. Correct. The intraseptal injection is a delivery of one to two rubber stopper widths, or 0.2 to 0.4 mL, of local anesthetic in not less than 20 s.
   b. This deposition exceeds the correct dosage, and truncates the correct rate of delivery; the intraseptal injection delivers 0.2 to 0.4 mL of anesthetic solution in no less than 20 s.
   c. This deposition exceeds the correct dosage and rate of delivery; the intraseptal injection delivers 0.2 to 0.4 mL of anesthetic solution in no less than 20 s.
   d. This deposition exceeds the correct dosage and rate of delivery; the intraseptal injection delivers 0.2 to 0.4 mL of anesthetic solution in no less than 20 s.

   **REF**: p. 264

13. **ANS**: a
   a. Correct. The needle comes in contact with the interdental septum, and is guided 1–2 mm inside it to the deposition site of the intraseptal injection.
   b. The needle must pass into the interdental septum 1 or 2 mm to reach the site of deposition for the intraseptal injection.
   c. The site of deposition for the intraseptal injection is not 1–2 mm from the surface of the interdental septum, but 1–2 mm within it.
   d. The site of deposition for the intraseptal injection is not 3–5 mm from the surface of the interdental septum, but 1–2 mm within it.

   **REF**: p. 263

14. **ANS**: c
   a. An 8-mm long needle is used in the Stabident, not X-Tip, System for intraosseous anesthetic delivery.
   b. A conventional (20 mm) short, not ultrashort (10 mm), needle is used in the X-Tip System for intraosseous anesthetic delivery.
   c. Correct. The X-Tip System is a combination drill tip and guide sleeve, which accepts a conventional short (20 mm long) needle.
   d. The X-Tip System is a combination drill tip and guide sleeve, which accepts a conventional short (20 mm), not long (32 mm) needle.

   **REF**: pp. 264–265
15. **ANS: c**
   a. The drill or needle makes the “hole” in the bone and delivers the anesthetic.
   b. The latch tip drives the rotation of the needle or drill.
   c. **Correct.** The transfuser is the conduit from the cartridge, channeling the anesthetic to the needle.
   d. The infusion drive powers the rotation of the needle or drill, as well as the infusion plunger.

   REF: p. 265

16. **ANS: d**
   a. Both the statement and reason are correct and related.
   b. The reason is correct. Heart palpitations are associated with the use of vasopressor-containing local anesthetics in intraosseous (IO) injections.
   c. The statement is correct. Plain local anesthetic solutions are recommended for IO injections.
   d. **Correct.** Both the statement and the reason are correct and related. Plain local anesthetics are recommended over vasopressor-containing solutions for IO injections due to the inherent vascularity of the injection site, which increases the likelihood of palpitations.

   REF: p. 265

17. **ANS: a**
   a. **Correct.** Slow deposition is particularly important to safe intraosseous anesthesia.
   b. Plain anesthetics are recommended, as opposed to those containing vasopressors, for safe intraosseous anesthesia; slow anesthetic deposition is advised.
   c. Intravascular injection is extremely unlikely (0% positive aspiration), and frequent aspirations are not required or advised. However, the slow deposition of anesthetic solution is paramount to safe intraosseous anesthesia.
   d. Infection or severe inflammation at the injection site is a clear contraindication for an intraosseous injection; slow deposition into uninfected tissue is advised.

   REF: p. 267

18. **ANS: c**
   a. Postinjection pain is not anticipated following an intraosseous injection; in fact, such pain is unlikely.
   b. Postinjection pain is not commonly experienced following an intraosseous injection; in fact, such pain is unlikely.
   c. **Correct.** Postinjection pain is unlikely, but easily managed, in connection with intraosseous anesthesia.
   d. Postinjection pain is an unlikely, but not rare, occurrence after intraosseous anesthesia.

   REF: p. 268
19. **ANS: b**
   a. Intraosseous anesthesia usually lasts between 15 and 30 minutes, depending on the anesthetic solution.
   b. **Correct.** The duration of intraosseous anesthesia is approximately 15–30 minutes.
   c. The maximum expected duration of intraosseous anesthesia is 30 minutes, if the anesthetic solution contains a vasopressor; plain anesthetic will provide only 15 minutes of intraosseous anesthesia.
   d. The maximum expected duration of intraosseous anesthesia is 30 minutes, if the anesthetic solution contains a vasopressor; plain anesthetic will provide only 15 minutes of intraosseous anesthesia.

   **REF: p. 268**

20. **ANS: b**
   a. Intrapulpal anesthesia is particularly useful for mandibular molars, because few alternative anesthetic techniques can anesthetize these teeth. An intrapulpal injection will anesthetize the maxillary canine, as will a supraperiosteal injection or nerve block (ASA, AMSA, maxillary).
   b. **Correct.** The intrapulpal injection is particularly helpful in achieving pain control for mandibular molars, as few other anesthetic techniques will.
   c. Intrapulpal anesthesia is particularly useful for mandibular molars, because few alternative anesthetic techniques can anesthetize these teeth. An intrapulpal injection will anesthetize the mandibular incisor, as will infiltration with articaine HCl and epinephrine 1:100,000.
   d. Intrapulpal anesthesia is particularly useful for mandibular molars, because few alternative anesthetic techniques can anesthetize these teeth. An intrapulpal injection will anesthetize the maxillary premolar, as will a supraperiosteal injection or nerve block (MSA, AMSA, maxillary).

   **REF: p. 269**

21. **ANS: a**
   a. **Correct.** The intrapulpal injection is mildly to severely traumatic for a brief period; pain relief usually occurs immediately thereafter.
   b. The intrapulpal injection anesthetizes only the involved tooth, not the associated gingiva.
   c. Although the onset of anesthesia is immediate, the dental procedure should not commence until 30 seconds have transpired, to ensure profound anesthesia.
   d. Needle retrieval after an intrapulpal injection is simple, not difficult, because the needle tip is contained within the hard tissues of the coronal pulp chamber.

   **REF: p. 269**
22. **ANS: b**
   a. Profound intrapulpal anesthesia is more difficult to produce when large areas of decay are present.
   b. **Correct.** A small opening into the pulp chamber, as with a deep pit cavitation, is needed for optimal intrapulpal anesthesia.
   c. Inflamed pulp tissue may minimize the effectiveness of the anesthetic.
   d. If the needle does not fit snugly into the root canal, the anesthesia is limited; pressure anesthesia is absent in such cases.

REF: p. 269

23. **ANS: a**
   a. **Correct.** Articaine 4% with epinephrine 1:100,000 is recommended for mandibular infiltration.
   b. Articaine, not lidocaine, is most effective for mandibular infiltrations.
   c. Articaine, not prilocaine, is most effective for mandibular infiltrations.
   d. Articaine, not mepivacaine, is most effective for mandibular infiltrations.

REF: pp. 274–275

24. **ANS: b**
   a. Splitting the anesthetic dose in the mandibular molar region is not effective, or recommended for articaine infiltration.
   b. **Correct.** A split dose of articaine 4% is recommended for the infiltration of mandibular incisors.
   c. A split dose of articaine 4% is recommended for the infiltration of mandibular incisors.
   d. The current recommendation for premolar infiltration is to administer a full cartridge of articaine 4% in the mucobuccal fold adjacent to the first molar.

REF: p. 275

25. **ANS: d**
   a. Two readings are required to conclusively confirm pulpal anesthesia; readings less than 80 µA are likely to produce pain during operative procedures.
   b. Two readings are required to conclusively confirm pulpal anesthesia.
   c. Readings less than 80 µA are likely to produce pain during operative procedures.
   d. **Correct.** Two consecutive EPT readings within 2 or 3 minutes at maximal output, 80 µA, provide solid confirmation of profound pulpal anesthesia.

REF: p. 275
Multiple Choice

1. The pH of a buffered local anesthetic solution approximates
   a. 3.5.
   b. 4.65.
   c. 6.5.
   d. 7.35.

2. Which technique is NOT recommended for the endodontic treatment of an infected tooth?
   a. Intraseptal injection.
   b. Regional nerve block.
   c. Intraosseous injection.
   d. Supraperiosteal injection.

3. Which motion permits the perforator to penetrate bone for an intraosseous injection?
   a. Pecking.
   b. Circular.
   c. Sweeping.
   d. Pendulous.

4. Tachycardia in a healthy patient following intraosseous anesthesia will likely resolve within
   a. 30 seconds.
   b. 60 seconds.
   c. 2 minutes.
   d. 4 minutes.

5. In which patient is an intraseptal injection most successful?
   a. Old.
   b. Male.
   c. Young.
   d. Female.

6. Which statement is true?
   a. A 27-gauge long needle is recommended for the periodontal ligament (PDL) injection.
   b. When needed, bending the needle for a PDL injection is acceptable.
   c. The PDL injection is effective in the presence of infection and inflammation.
   d. Pressure syringes enable the PDL injection to be administered more comfortably.
7. Which eases the intense pain of opening the pulp chamber for intrapulpal injection?
   a. High-speed, low-torque drill.
   b. Enamel saturation with local anesthetic.
   d. Local infiltration of the adjacent soft tissue.

8. Pulpal pain usually resolves after the first endodontic procedure. Once the pulp tissue is removed, soft tissue anesthesia is no longer necessary.
   a. Both statements are true.
   b. Both statements are false.
   c. The first statement is true; the second is false.
   d. The first statement is false; the second is true.

9. Which factor establishes the maximum recommended dose (MRD) of a local anesthetic?
   a. Age.
   b. Height.
   c. Weight.
   d. Procedure.

10. Which recommendation applies to pediatric dentistry?
    a. Use a plain local anesthetic.
    b. Practice multiple-quadrant dentistry.
    c. Administer the largest safe dose to older children.
    d. Administer supraperiosteal infiltrations on primary teeth.

11. Phentolamine mesylate (Oraverse) is approved for use in patients
    a. 4 years of age or older, weighing more than 25 kg (55 lb).
    b. 5 years of age or older, weighing more than 20 kg (44 lb).
    c. 6 years of age or older, weighing more than 15 kg (33 lb).
    d. 7 years of age or older, weighing more than 10 kg (22 lb).

12. Self-inflicted soft tissue trauma usually involves the
    a. cheek.
    b. tongue.
    c. upper lip.
    d. lower lip.

13. Which is recommended to manage self-inflicted soft tissue trauma?
    a. Salt-water rinse.
    b. Petroleum jelly.
    c. Topical antiseptic.
    d. Topical anesthetic.

14. Compared to adults, pediatric patients
    a. experience a slower onset of local anesthesia.
    b. need notably different local anesthetic techniques.
    c. require a larger dose of local anesthetic for clinical results.
    d. exhibit a higher success rate with the inferior alveolar nerve block.
15. Which needle is used for all pediatric injections?
   a. 25-gauge short.
   b. 25-gauge long.
   c. 27-gauge short.
   d. 27-gauge long.

16. In the primary dentition, the mental foramen is usually located
   a. between the two molars.
   b. slightly mesial to the canine.
   c. behind the most posterior molar.
   d. between the canine and first molar.

17. Which is contraindicated on primary teeth?
   a. Incisive nerve block.
   b. Supraperiosteal infiltration.
   c. Inferior alveolar nerve block.
   d. Periodontal ligament injection.

18. Which anesthetic technique is particularly effective for periodontal flap surgery?
   a. Intraseptal.
   b. Intrapulpal.
   c. Intrarosseous.
   d. Intraligamentary.

19. Which drug is recommended for local hemostasis?
   a. Epinephrine.
   b. Levonordefrin.
   c. Norepinephrine.
   d. Neo-Synephrine.

20. Rebound vasodilation after hemostasis is NOT linked to postsurgical
   a. pain.
   b. bleeding.
   c. tachycardia.
   d. delayed healing.

21. Which statement is true?
   a. General anesthesia prevents pain.
   b. A local anesthetic is unwarranted when general anesthesia is used.
   c. Oral surgery decreases the blood pressure, heart rate, and respiratory rate.
   d. Maxillofacial surgeons frequently treat patients who are under general anesthesia.

22. Each dental specialty requires prolonged local anesthesia, EXCEPT one. Which is the EXCEPTION?
   b. Periodontics.
   c. Orthodontics.
   d. Prosthodontics.
23. Which statement is correct?
   a. Bupivacaine is a homolog of lidocaine.
   b. Bupivacaine provides 8 hours of mandibular postoperative analgesia.
   c. The duration of bupivacaine is prolonged by the addition of epinephrine.
   d. Bupivacaine is given by supraperiosteal injection for maximum clinical duration.

24. To manage pain after dental surgery, opioid analgesics are
   a. exceptionally effective.
   b. moderately effective.
   c. not very effective.
   d. not at all effective.

25. Which drug is administered preoperatively to lessen postoperative pain?
   a. Ibuprofen.
   b. Tramadol.
   c. Morphine.
   d. Oxycodone.

**Feedback**

1. ANS: d
   a. Vasoconstrictor-containing local anesthetics have a pH of approximately 3.5; buffered solutions have a pH near the body’s natural pH of 7.4.
   b. Buffered solutions have a pH in the range of 7.35 to 7.5, near the body’s natural pH. An anesthetic with a pH of 4.65 is not buffered and likely contains a vasoconstrictor.
   c. Plain, unbuffered local anesthetics have a pH of approximately 6.5; buffered solutions are approximately 7.35 to 7.5.
   d. **Correct.** Buffered local anesthetic solutions have a pH in the range of 7.35 to 7.5; the body’s normal pH is approximately 7.4.

   REF: p. 277

2. ANS: d
   a. An intraseptal injection is a practical means of pain control for the endodontic treatment of an infected tooth.
   b. A regional nerve block is a practical means of pain control for the endodontic treatment of an infected tooth.
   c. An intraosseous injection is a practical means of pain control for the endodontic treatment of an infected tooth.
   d. **Correct.** A supraperiosteal injection is contraindicated when infection is obviously present.

   REF: p. 278
3. ANS: a  
   a. **Correct.** A light “pecking” motion permits the perforator to penetrate the bone for an intraosseous injection. 
   b. A pecking, not circular, motion is needed to penetrate bone for intraosseous anesthesia. 
   c. A pecking, not sweeping, motion is needed to penetrate bone for intraosseous anesthesia. 
   d. A pecking, not pendulous, motion is needed to penetrate bone for intraosseous anesthesia. 

   REF: p. 278

4. ANS: d  
   a. Transient tachycardia resolves within 4 minutes, not 30 seconds, of an intraosseous injection, so long as the patient has no cardiovascular ailments. 
   b. Transient tachycardia resolves within 4 minutes, not 60 seconds, of an intraosseous injection, so long as the patient has no cardiovascular ailments. 
   c. Transient tachycardia resolves within 4, not 2, minutes of an intraosseous injection, so long as the patient has no cardiovascular ailments. 
   d. **Correct.** Transient tachycardia produced by rapid absorption of an intraosseous injection resolves within 4 minutes, when no cardiovascular complications exist. 

   REF: p. 278

5. ANS: c  
   a. Older patients exhibit increased bone density, making successful intraseptal anesthesia less likely than in younger patients. 
   b. Intraseptal anesthesia has no predilection for gender; younger patients experience greater success with intraseptal anesthesia than older patients. 
   c. **Correct.** Young patients have decreased bone density, improving the likelihood for successful intraseptal anesthesia. 
   d. Intraseptal anesthesia has no predilection for gender; younger patients experience greater success with intraseptal anesthesia than older patients. 

   REF: p. 279

6. ANS: b  
   a. A 27-gauge short, not long, needle is used to administer the PDL injection. 
   b. **Correct.** Bending the needle is acceptable, if required to gain access to the deposition site of a PDL injection. 
   c. Inflammation and infection can thwart the success of the PDL injection. 
   d. Computer-controlled local anesthetic delivery (C-CLAD) increases the comfort of the PDL injection; use of a pressure syringe does not. 

   REF: p. 278
7. ANS: c
   a. Use of a slow-speed, high-torque drill is less traumatic than a high-speed low-torque instrument. Sedation will ease the pain associated with establishing pulpal access.
   b. Nitrous oxide–oxygen inhalation sedation is recommended to ease the pain of opening the pulp chamber for intrapulpal anesthesia; enamel saturation is not.
   c. Correct. Nitrous oxide–oxygen inhalation sedation will relax the patient and increase the pain threshold to ease the pain associated with establishing pulpal access.
   d. Nitrous oxide–oxygen inhalation sedation is recommended to ease the pain of opening the pulp chamber for intrapulpal anesthesia; local infiltration is not.

REF: p. 279

8. ANS: c
   a. The second statement is false; removal of the pulp tissue eliminates the need for pulpal, not soft tissue, anesthesia.
   b. The first statement is true. Difficulty anesthetizing a patient for an endodontic procedure is unique to the first appointment.
   c. Correct. The first statement is true; pulpal pain, and any difficulty encountered in its management, dissipates after the first endodontic appointment. The second statement is false; soft tissue sensation is unaffected by the removal of the pulp tissue. Once the pulp tissue is removed, pulpal anesthesia is no longer needed; however, soft tissue anesthesia is still necessary.
   d. The first statement is true; the second is false.

REF: p. 278

9. ANS: c
   a. The MRD of a local anesthetic is established by the patient’s weight, not age.
   b. The MRD of a local anesthetic is established by the patient’s weight, not height.
   c. Correct. The MRD of a local anesthetic should be calculated by body weight, which corresponds with the blood level of a patient.
   d. The MRD of a local anesthetic is established by the patient’s weight, not the type of procedure.

REF: p. 280

10. ANS: d
    a. Vasopressor-containing anesthetics are recommended for pediatric patients to decrease the risk of anesthetic overdose.
    b. Practicing multiple-quadrant dentistry with local anesthesia contributes to increased risk of anesthetic overdose.
    c. The smallest effective dose is recommended for all patients, including children.
    d. Correct. Supraperiosteal infiltration is the anesthetic technique of choice for all primary teeth.

REF: p. 283
11. ANS: c
   a. Oraverse should not be administered to children who are younger than 6 years of age.
   b. Oraverse is not approved for use in children younger than 6 years of age.
   c. Correct. The FDA has approved the use of Oraverse in patients 6 years of age or older, weighing more than 15 kg (33 lb).
   d. Oraverse is not approved for use in patients that weigh less than 15 kg (33 lb).

   REF: p. 282

12. ANS: d
   a. The lower lip is more frequently involved in self-inflicted trauma than the cheek.
   b. The lower lip is more frequently involved in self-inflicted trauma than the tongue.
   c. The lower lip is more frequently involved in self-inflicted trauma than the upper lip.
   d. Correct. The lower lip is the most common location of self-inflicted soft tissue trauma, associated with residual anesthesia.

   REF: p. 281

13. ANS: b
   a. Lubricant coating, not salt-water rinse, is recommended in the management of self-inflicted soft tissue trauma.
   b. Correct. Coating the injury with a lubricant, like petroleum jelly, is recommended to prevent the drying, cracking, and pain associated with a self-inflicted injury.
   c. Lubricant coating, not topical antiseptic, is recommended in the management of self-inflicted soft tissue trauma.
   d. Lubricant coating, not topical anesthetic, is recommended in the management of self-inflicted soft tissue trauma.

   REF: p. 282

14. ANS: d
   a. The decreased bone density of a pediatric patient facilitates the rapid absorption of local anesthetic to produce a more rapid onset of anesthesia.
   b. Local anesthetic techniques for children are not notably different from those designed for adults.
   c. Children usually require less, not more, local anesthetic to elicit clinical results.
   d. Correct. The inferior alveolar nerve block is a highly successful technique in pediatric patients.

   REF: p. 283

15. ANS: c
   a. A 25-gauge short needle can be used for pediatric IANB injections; however, the 27-gauge short needle is used in all pediatric injections, including the IANB.
   b. The 27-gauge short needle is used for all pediatric injections, as opposed to the 25-gauge long needle.
   c. Correct. The 27-gauge short needle is recommended for all pediatric injections.
   d. The 27-gauge short, not long, needle is used for all pediatric injections.

   REF: p. 283
16. ANS: a  
   a. Correct. In the deciduous dentition, the mental foramen is located between the two primary molars.  
   b. The mental foramen lies between the two molars, not mesial to the canine, in the primary dentition.  
   c. The mental foramen lies between the two molars, not behind the most posterior molar, in the primary dentition.  
   d. The mental foramen lies between the two molars, not between the canine and first molar, in the primary dentition.  

REF: p. 284

17. ANS: d  
   a. The incisive nerve block is safe and effective for primary teeth; the periodontal ligament injection is not.  
   b. Supraperiosteal infiltrations are safe and effective for primary teeth; periodontal ligament injections are not.  
   c. The inferior alveolar nerve block is safe and effective for primary teeth; the periodontal ligament injection is not.  
   d. Correct. The PDL injection is linked to enamel hypoplasia of developing permanent tooth buds, when used on primary teeth.  

REF: p. 284

18. ANS: a  
   a. Correct. Intraseptal anesthesia is very effective for periodontal flap procedures.  
   b. Intraseptal, not intrapulpal, anesthesia is valuable to periodontal flap procedures.  
   c. Intraseptal, not intraosseous, anesthesia is especially effective for periodontal flap procedures.  
   d. Intraseptal, not intraligamentary, anesthesia is particularly effective for periodontal flap procedures.  

REF: p. 284

19. ANS: a  
   a. Correct. Epinephrine is the preferred drug for local hemostasis.  
   b. Epinephrine is preferred over levonordefrin for local hemostasis.  
   c. Epinephrine is preferred over norepinephrine for local hemostasis.  
   d. Epinephrine is preferred over Neo-Synephrine for local hemostasis.  

REF: p. 284

20. ANS: c  
   a. Rebound vasodilation may increase postsurgical pain.  
   b. Rebound vasodilation, following the injection of epinephrine, produces postsurgical bleeding, 6 hours after the injection.  
   c. Correct. Rebound vasodilation is not linked to postsurgical tachycardia.  
   d. Postsurgical bleeding, in connection with rebound vasodilation, may interfere with the healing process.  

REF: p. 284
21. **ANS:** d  
   a. General anesthesia does not prevent pain.  
   b. Local anesthesia is warranted and routinely used in conjunction with general anesthesia.  
   c. Oral surgery increases the blood pressure, heart rate, and respiratory rate.  
   d. Correct. Maxillofacial surgeons frequently treat patients who are under general anesthesia.  

   **REF:** pp. 284–285

22. **ANS:** c  
   a. Prolonged local anesthesia is critical to the success of many surgical procedures.  
   b. Prolonged local anesthesia is critical to the success of many periodontal procedures.  
   c. Correct. Oral surgery, periodontics, and prosthodontics are specialties in which prolonged anesthesia is a necessity; orthodontics is not.  
   d. Prolonged local anesthesia is critical to the success of many prosthodontic procedures.  

   **REF:** p. 285

23. **ANS:** b  
   a. Bupivacaine is a homolog of mepivacaine, not lidocaine.  
   b. Correct. Bupivacaine provides 8 hours of postoperative analgesia in the mandible.  
   c. The duration of bupivacaine is not prolonged by the addition of epinephrine.  
   d. Bupivacaine is administered as a regional nerve block for maximum clinical duration; when administered as a supraperiosteal injection, the duration is shorter.  

   **REF:** p. 285

24. **ANS:** c  
   a. Opioid analgesics are not very effective in the management of pain following dental surgery.  
   b. Opioid analgesics are not very effective in the management of pain following dental surgery.  
   c. Correct. Opioid analgesics are not very effective in the management of pain following dental surgery.  
   d. Opioid analgesics are used for postsurgical pain, but they are not very effective for the management of pain after dental surgery.  

   **REF:** p. 286

25. **ANS:** a  
   a. Correct. Nonsteroidal anti-inflammatory drugs (NSAIDs), like ibuprofen, delay the onset and decrease the severity of postoperative pain when administered preoperatively.  
   b. Preoperative administration of an NSAID is believed to lessen postoperative pain. Tramadol is not an NSAID, but an opioid.  
   c. Preoperative administration of an NSAID is believed to lessen postoperative pain. Morphine is not an NSAID, but an opioid.  
   d. Preoperative administration of an NSAID is believed to lessen postoperative pain. Oxycodone is not an NSAID, but an opioid.  

   **REF:** p. 286
Local Complications

Multiple Choice

1. Needle breakage occurs most frequently during which nerve block?
   a. Infraorbital.
   b. Nasopalatine.
   c. Inferior alveolar.
   d. Posterior superior alveolar.

2. Needle breakage always occurs
   a. at the hub.
   b. along the shaft.
   c. at the tip of the bevel.
   d. at the base of the bevel.

3. Paresthesia is best defined as
   a. bilateral anesthesia.
   b. transient anesthesia.
   c. persistent anesthesia.
   d. inadequate anesthesia.

4. Which is least likely to elicit paresthesia?
   a. Hemorrhage near the neural sheath.
   b. Administration of bupivacaine HCl.
   c. Injection of a contaminated anesthetic.
   d. Trauma to the nerve sheath via needle contact.

5. Most paresthesias resolve without treatment within
   a. 72 hours.
   b. 3 weeks.
   c. 2 months.
   d. 1 year.

6. Transient facial paralysis is associated with which injection?
   a. Inferior alveolar nerve block (IANB).
   b. Middle superior alveolar (MSA).
   c. Posterior superior alveolar (PSA).
   d. Anterior middle superior alveolar (AMSA).
7. Transient facial paralysis results when which cranial nerve is anesthetized?
   a. V.
   b. VII.
   c. IX.
   d. XI.

8. A prolonged jaw muscle spasm, which restricts the opening of the mouth, is called
   a. ageusia.
   b. trismus.
   c. paralysis.
   d. dysesthesia.

9. When initial attempts to abate trismus fail, which element is added to the treatment?
   a. Aspirin.
   b. Antibiotics.
   c. Heat therapy.
   d. Physiotherapy.

10. The possibility that an infection will develop from a self-inflicted soft tissue injury is
    a. certain.
    b. likely.
    c. unlikely.
    d. remote.

11. A hematoma rarely develops following which injection?
    a. Mental.
    b. Nasopalatine.
    c. Inferior alveolar.
    d. Posterior superior alveolar.

12. The swelling and discoloration of a hematoma gradually resolves within
    a. 5–7 days.
    b. 7–14 days.
    c. 12–24 hours.
    d. 48–72 hours.

13. Which needle-induced hematoma is only visible within the mouth?
    a. Buccal.
    b. Incisive.
    c. Anterior superior alveolar.
    d. Posterior superior alveolar.

14. Which therapy is NOT recommended, for at least 4–6 hours after a hematoma develops?
    a. Ice.
    b. Heat.
    c. Pressure.
    d. Analgesic.
15. Which increases pain on injection?
   a. Sharp needle.
   b. Rapid deposition.
   c. Buffered local anesthetic.
   d. Topical anesthetic before injection.

16. The ideal rate of injection to inject local anesthetic is
   a. 1 mL/min.
   b. 1.8 mL/min.
   c. 2 mL/min.
   d. 2.5 mL/min.

17. Which statement is true?
   a. Postinjection infection is a common occurrence in dentistry.
   b. Normal oral flora is a major contributor to postinjection infection.
   c. The primary cause of postinjection infection is contaminated anesthetic.
   d. The needle is always contaminated when it touches the oral mucous membrane.

18. The presence of a low-grade postinjection infection is realized when
   a. a hematoma develops.
   b. paralysis becomes evident.
   c. treatment for trismus is ineffective.
   d. postanesthetic intraoral lesions appear.

19. Which antibiotic is prescribed for the treatment of postinjection infection?
   a. Penicillin V.
   b. Tetracycline.
   c. Erythromycin.
   d. Sulfacetamide.

20. Each of these produces edema EXCEPT one. Which is the EXCEPTION?
   a. Low-grade infection.
   b. Trauma during injection.
   c. Topical anesthetic allergy.
   d. Prolonged application of topical anesthetic.

21. Which condition is characterized by the sudden onset of brawny nonpitting edema?
   a. Bell’s palsy.
   b. Hereditary angioedema.
   c. Von Willebrand disease.
   d. Recurrent aphthous stomatitis.

22. Which describes the recommended treatment for a sterile abscess?
   a. No formal management is indicated.
   b. Apply direct pressure to the injection site.
   c. Prescribe a 7- to 10-day course of antibiotics.
   d. Encourage lukewarm saline rinses to decrease swelling.
23. To prevent epithelial desquamation, topical anesthetics are applied for a maximum of
   a. 1–2 minutes.
   b. 3–4 minutes.
   c. 5–6 minutes.
   d. 7–8 minutes.

24. Herpes simplex
   a. is a bacterial disease.
   b. is most often observed intraorally.
   c. usually develops on immovable tissue.
   d. is the most common oral mucosal disease.

25. Which should NOT be used to soothe painful postanesthetic intraoral lesions?
   a. Orabase with Kenalog.
   b. Tannic acid preparation (Zilactin).
   c. Topical anesthetic solutions (viscous lidocaine).
   d. A mixture of diphenhydramine (Benadryl) and milk of magnesia.

Feedback

1. ANS: c
   a. There are no reported cases of needle breakage in association with the infraorbital nerve
      block; most cases involve the IANB and PSA techniques.
   b. There are no reported cases of needle breakage during the nasopalatine nerve block; most
      cases involve the IANB and PSA techniques.
   c. Correct. Most cases involving needle breakage are reported to occur during the admin-
      istration of the inferior alveolar nerve block.
   d. Needle breakage does occur during the administration of the posterior alveolar nerve
      block, but much less frequently than with the inferior alveolar nerve block.

   REF: p. 292

2. ANS: a
   a. Correct. Dental needles always break at the hub.
   b. Needle breakage always occurs at the needle hub, never along the shaft.
   c. Needle breakage always occurs at the needle hub, not at the tip of the bevel.
   d. Needle breakage always occurs at the needle hub, not at the base of the bevel.

   REF: p. 293

3. ANS: c
   a. Paresthesia is persistent, not bilateral, anesthesia.
   b. Paresthesia is persistent, not transient, anesthesia.
   c. Correct. Persistent anesthesia, far beyond the expected duration, defines paresthesia.
   d. Paresthesia is persistent, not inadequate, anesthesia.

   REF: p. 294
4. ANS: b
   a. Hemorrhage near the neural sheath may elicit paresthesia.
   b. Correct. Bupivacaine HCl is unlikely to cause paresthesia.
   c. Injection of a contaminated anesthetic can produce long-term paresthesia.
   d. Trauma to the nerve sheath via needle contact is a common cause of paresthesia.

   REF: pp. 294–295, 297; Table 17-2, Table 17-3, Table 17-4

5. ANS: c
   a. Some cases of paresthesia may resolve quickly; however, most require approximately 2 months.
   b. Most paresthesias resolve within 8, not 3, weeks.
   c. Correct. Most cases of paresthesia resolve without treatment within 2 months.
   d. Some paresthesias may require a year to resolve, but most dissipate within 2 months.

   REF: p. 298

6. ANS: a
   a. Correct. Advancing the needle in a posterior direction during the IANB may result in transient facial paralysis if the anesthetic is inadvertently deposited within the parotid gland.
   b. Transient facial paralysis is a complication linked to the IANB, not the MSA injection.
   c. Transient facial paralysis is a complication linked to the IANB, not the PSA injection.
   d. Transient facial paralysis is a complication linked to the IANB, not the AMSA injection.

   REF: p. 300

7. ANS: b
   a. The seventh (VII), not fifth (V), cranial nerve is anesthetized to produce transient facial paralysis.
   b. Correct. The seventh (VII) cranial nerve innervates the muscles of facial expression; its inadvertent anesthesia results in transient hemiparalysis of the face.
   c. The seventh (VII), not ninth (IX), cranial nerve is anesthetized to produce transient facial paralysis.
   d. The seventh (VII), not eleventh (XI), cranial nerve is anesthetized to produce transient facial paralysis.

   REF: p. 299

8. ANS: b
   a. Trismus is the restricted opening of the mouth; ageusia is the loss of taste.
   b. Correct. Trismus is a restricted opening of the mouth due to a prolonged jaw muscle spasm.
   c. Trismus is the restricted opening of the mouth; paralysis is the loss of motor function to the muscles.
   d. Trismus is the restricted opening of the mouth; dysesthesia is a painful sensation.

   REF: p. 301
9. ANS: b
   a. Aspirin therapy is part of the initial treatment regimen for trismus; antibiotics are only added when the initial therapy fails.
   b. **Correct.** Antibiotics are prescribed when the initial treatment regimen for trismus proves unsuccessful.
   c. Heat therapy is part of the initial treatment regimen for trismus; antibiotics are added only when the initial therapy fails.
   d. Physiotherapy is part of the initial treatment regimen for trismus; antibiotics are added only when the initial therapy fails.

REF: p. 302

10. ANS: d
    a. Infection is not a certain outcome for self-inflicted soft tissue injury; in fact, the possibility of infection is remote.
    b. Infection is not likely to occur with self-inflicted soft tissue injury; in fact, the possibility of infection is remote.
    c. Infection is a remote possibility for a self-inflicted soft tissue injury.
    d. **Correct.** Infection is a remote possibility for a self-inflicted soft tissue injury.

REF: p. 302

11. ANS: b
    a. The tissues surrounding the mental nerve readily accommodate significant volumes of blood, increasing the likelihood of a hematoma.
    b. **Correct.** Hematomas rarely develop following a palatal injection, like the nasopalatine.
    c. The tissues surrounding the inferior alveolar nerve readily accommodate significant volumes of blood, increasing the likelihood of a hematoma.
    d. The tissues surrounding the posterior superior alveolar nerve readily accommodate significant volumes of blood, increasing the likelihood of a hematoma.

REF: p. 303

12. ANS: b
    a. 7–14 days, rather than 5–7 days, are required for a needle-induced hematoma to resolve.
    b. **Correct.** The swelling and discoloration of a hematoma progressively dissipates over 7–14 days.
    c. 7–14 days, rather than 12–24 hours, are required for a needle-induced hematoma to resolve.
    d. 7–14 days, rather than 48–72 hours, are required for a needle-induced hematoma to resolve.

REF: p. 303
13. ANS: a  
   a. Correct. A hematoma that follows a buccal nerve block is usually only visible within the mouth.  
   b. A hematoma that follows an incisive nerve block appears externally on the skin of the chin.  
   c. A hematoma that follows an anterior superior alveolar nerve block appears externally on the skin below the eye.  
   d. A hematoma that follows a posterior superior alveolar nerve block appears externally on the skin of the cheek.  

   REF: p. 304

14. ANS: b  
   a. Ice may be applied immediately upon the initial signs of hematoma development.  
   b. Correct. Heat therapy is discouraged for at least 4–6 hours following the development of a hematoma.  
   c. Pressure therapy is advised immediately upon recognition of a developing hematoma.  
   d. Analgesic therapy is recommended if soreness develops in association with a hematoma.  

   REF: p. 304

15. ANS: b  
   a. A sharp needle decreases, not increases, pain on injection.  
   b. Correct. Rapid deposition of the anesthetic solution will increase pain on injection.  
   c. Buffered local anesthetic decreases, not increases, pain on injection.  
   d. Topical anesthetic before injection decreases, not increases, pain on injection.  

   REF: p. 304-305

16. ANS: a  
   a. Correct. The ideal rate of injection is 1 mL/min; rapid deposition is associated with burning and pain on injection.  
   b. The recommended rate of injection is 1.8 mL/min; however, the ideal rate of injection is even slower: 1 mL/min. The slower the injection the more comfortable it is to receive.  
   c. The ideal injection speed is 1 mL/min, not 2 mL/min; rapid deposition is associated with burning and pain on injection.  
   d. The ideal injection speed is 1 mL/min, not 2.5 mL/min; rapid deposition is associated with burning and pain on injection.  

   REF: p. 305

17. ANS: d  
   a. Postinjection infection is an extremely rare occurrence in dentistry.  
   b. Normal oral flora does not cause postinjection infection.  
   c. The primary cause of postinjection infection is not contaminated anesthetic, but contamination of the dental needle.  
   d. Correct. Contact with the oral mucous membrane always contaminates the anesthetic needle.  

   REF: p. 305
18. ANS: c
   a. Development of a hematoma is indicative of hemorrhage, not infection.
   b. Paralysis is indicative of inadvertent facial nerve anesthesia, not infection.
   c. Correct. When treatment for trismus is ineffective, an infection is suspected and antibiotics are prescribed.
   d. Postanesthetic intraoral lesions are indicative of recurrent aphthous stomatitis or herpes simplex, not low-grade infection.

   REF: p. 306

19. ANS: a
   a. Correct. Penicillin V is the antibiotic of choice for the treatment of postinjection infection.
   b. Penicillin V, rather than tetracycline, is the recommended drug to resolve low-grade postinjection infection.
   c. Penicillin V is the recommended drug to resolve low-grade postinjection infection; erythromycin is the second choice when an allergy to penicillin exists.
   d. Penicillin V, rather than sulfacetamide, is the recommended drug to resolve low-grade postinjection infection.

   REF: p. 306

20. ANS: d
   a. Edema is a common sign of infection.
   b. Edema is a common sign of trauma.
   c. Edema is a common sign of allergy.
   d. Correct. Sloughing of the tissues is the expected outcome of prolonged topical anesthetic exposure.

   REF: pp. 306–307

21. ANS: b
   a. Hereditary angioedema, not Bell’s palsy, is identified by the sudden onset of nonpitting edema.
   b. Correct. Sudden brawny nonpitting edema is a marked characteristic of hereditary angioedema.
   c. Hereditary angioedema, not Von Willebrand, is identified by the sudden onset of nonpitting edema.
   d. Hereditary angioedema, not recurrent aphthous stomatitis, is identified by the sudden onset of nonpitting edema.

   REF: p. 306
22. ANS: a  
a. Correct. A sterile abscess will resolve without treatment within 7–10 days; no formal management is necessary.  
b. Direct pressure at the injection site is an important first step in the treatment of a hematoma; no formal treatment is indicated for a sterile abscess.  
c. Antibiotic therapy is recommended in the treatment of postinjection infection; no formal treatment is indicated for a sterile abscess.  
d. Lukewarm saline rinses are recommended for self-inflicted soft tissue injury; no formal treatment is indicated for a sterile abscess.

REF: p. 307

23. ANS: a  
a. Correct. 1–2 minutes is the appropriate duration for the application of topical anesthetics.  
b. 3–4 minutes is an excessive application of topical anesthetic; prolonged mucous membrane contact with topical anesthetics leads to epithelial desquamation.  
c. 5–6 minutes is an excessive application of topical anesthetic; prolonged mucous membrane contact with topical anesthetics leads to epithelial desquamation.  
d. 7–8 minutes is an excessive application of topical anesthetic; prolonged mucous membrane contact with topical anesthetics leads to epithelial desquamation.

REF: p. 307

24. ANS: c  
a. Herpes simplex is a viral, not a bacterial disease.  
b. Herpes simplex may occur intraorally, but is most often observed extraorally.  
c. Correct. Herpes simplex usually develops on immovable tissues that are attached to underlying bone.  
d. Herpes simplex is not the most common oral mucosal disease; recurrent aphthous stomatitis is.

REF: p. 308

25. ANS: a  
a. Correct. Kenalog is not recommended to relieve the pain of postinjection lesions; its anti-inflammatory action increases viral and bacterial involvement.  
b. Tannic acid preparations (Zilactin) provide substantial pain relief for postanesthetic lesions for up to 6 hours.  
c. Topical anesthetic solutions (viscous lidocaine) provide effective pain relief for postanesthetic lesions.  
d. A mixture of diphenhydramine (Benadryl) and milk of magnesia provides effective pain relief from postanesthetic lesions.

REF: p. 308
Multiple Choice

1. Which term is currently used to describe the undesirable actions of a drug?
   a. Intolerance.
   b. Side effects.
   c. Drug-induced disease.
   d. Adverse drug reaction.

2. Which is consistent with a drug overdose reaction?
   a. The reactions are not dose related.
   b. The immune response is exaggerated.
   c. The same emergency management treats all reactions.
   d. The blood level of the drug determines the severity of the reaction.

3. Which term defines an abnormal, unexpected drug reaction?
   a. Allergy.
   b. Overdose.
   c. Idiosyncrasy.
   d. Toxic reaction.

4. Which factor is believed to influence all idiosyncratic drug reactions?
   a. Age.
   b. Gender.
   c. Disease.
   d. Genetics.

5. Overdose accounts for which proportion of all true adverse drug reactions?
   a. 99%
   b. 75%
   c. 50%
   d. 33%

6. Which patient is predisposed to local anesthetic overdose?
   a. Toddler.
   b. Adolescent.
   c. Middle-aged.
   d. Retirement-aged.
7. Which medication competes with lidocaine for hepatic oxidative enzymes?
   a. Quinidine.
   b. Cimetidine.
   c. Meperidine.
   d. Desipramine.

8. Women are more prone to local anesthetic overdose during
   a. puberty.
   b. pregnancy.
   c. menopause.
   d. menstruation.

9. Each increases the risk of anesthetic overdose, EXCEPT one. Which is the EXCEPTION?
   a. Heart failure.
   b. Hepatic disease.
   c. Renal dysfunction.
   d. Apprehension-induced stress.

10. The administrator has the least amount of control over which anesthetic factor?
    a. Dose.
    b. Concentration.
    c. Rate of injection.
    d. Injection site vascularity.

11. Atypical pseudocholinesterase presents
    a. a relative contraindication for the administration of ester local anesthetics.
    b. a relative contraindication for the administration of amide local anesthetics.
    c. an absolute contraindication for the administration of ester local anesthetics.
    d. an absolute contraindication for the administration of amide local anesthetics.

12. Which patient factor does NOT affect the maximum recommended dose of local anesthetic?
    a. Age.
    b. Weight.
    c. Physical status.
    d. Psychological attitude.

13. Which is the most common cause of local anesthetic overdose?
    a. Excessive total dose.
    b. Slow drug biotransformation.
    c. Inadvertent intravascular injection.
    d. Rapid absorption from the injection site.

14. Vasoconstrictors reduce systemic toxicity of local anesthetics; however, vasoconstrictors should be included in the local anesthetic solution only when deemed absolutely necessary.
    a. Both statements are true.
    b. Both statements are false.
    c. The first statement is true; the second is false.
    d. The first statement is false; the second is true.
15. Which is the most important factor in preventing adverse drug reactions?
   a. Aspiration.
   b. Needle gauge.
   c. Type of syringe.
   d. Rate of injection.

16. How many cartridges are needed to anesthetize the entire primary dentition?
   a. 1.
   b. 2.
   c. 3.
   d. 4.

17. Which indicates high overdose levels of local anesthetic?
   a. Vomiting.
   c. Stutter, twitching, and tremor.
   d. Elevated blood pressure, heart rate, and respiratory rate.

18. Overdose signs and symptoms after a rapid intravascular injection appear within
   a. seconds.
   b. 3–5 minutes.
   c. 10–30 minutes.
   d. 10 minutes to several hours.

19. Basic emergency management progresses through which sequence?
   a. Breathing, Circulation, Definitive Care, Position, Airway (B C D P A).
   b. Definitive Care, Circulation, Breathing, Airway, Position (D C B A P).
   d. Circulation, Airway, Breathing, Position, Definitive Care (C A B P D).

20. Which drug is indicated for the management of a mild overdose reaction?
   a. Oxygen.
   b. Midazolam.
   c. Nitrous oxide.
   d. Diphenhydramine.

21. Which statement is true?
   a. Cross-allergenicity does not occur with amide local anesthetics.
   b. Life-threatening allergic reactions to local anesthetics are not uncommon.
   c. Sodium bisulfite is not found in vasopressor-containing anesthetic cartridges.
   d. Allergy to one ester-type local anesthetic does not preclude the use of other esters.

22. Which is the primary method of assessing a local anesthetic allergy?
   b. Skin prick test.
   c. Skin patch test.
   d. Intracutaneous test.
23. Which type of allergic reaction develops days after antigenic exposure?
   a. I.
   b. II.
   c. III.
   d. IV.

24. The earliest phase of generalized anaphylaxis is identified by
   a. skin reactions.
   b. respiratory symptoms.
   c. gastrointestinal disturbances.
   d. cardiovascular involvement.

25. Which is the first step in the emergency management of laryngeal edema?
   a. Activate the Emergency Medical Service (EMS).
   b. Administer oxygen.
   c. Administer epinephrine.
   d. Perform a cricothyrotomy.

Feedback

1. ANS: d
   a. Intolerance is an antiquated term; adverse drug reaction (ADR) is the preferred term for the undesirable actions of a drug.
   b. Adverse drug reaction (ADR) is the preferred term for the undesirable actions of a drug; the term side effect is not recommended.
   c. Drug-induced disease is an antiquated term; adverse drug reaction (ADR) is the preferred term for the undesirable actions of a drug.
   d. Correct. Many terms have been used to describe the undesirable actions of a drug; the currently accepted term is adverse drug reaction (ADR).

REF: p. 311

2. ANS: d
   a. Drug overdose reactions are dose related.
   b. A drug overdose reaction is an extension of the expected action of a drug; an allergic reaction is an exaggerated immune response.
   c. All allergies require the same basic emergency treatment, whereas various overdose reactions require unique, specific modes of emergency management.
   d. Correct. The severity of a drug overdose reaction is directly related to the administered dose: the higher the blood level of the drug, the more severe the reaction.

REF: p. 312
3. ANS: c
   a. An allergic reaction involves a suspected or proven allergic mechanism; an idiosyncratic reaction is unexpected and abnormal.
   b. Overdose, or toxic reaction, is an extension of the normal pharmacologic action of a drug; an idiosyncratic reaction is unexpected and abnormal.
   c. Correct. An idiosyncrasy is an unexpected, abnormal drug response.
   d. Toxic reaction, or overdose, is an extension of the normal pharmacologic action of a drug; an idiosyncratic reaction is unexpected and abnormal.

   REF: p. 312

4. ANS: d
   a. Age is not a primary mechanism for all idiosyncratic drug reactions, but genetics are.
   b. Gender is not a primary mechanism for all idiosyncratic drug reactions, but genetics are.
   c. Disease is not a primary mechanism for all idiosyncratic drug reactions, but genetics are.
   d. Correct. Genetics play a significant role in the manifestation of all idiosyncratic drug reactions.

   REF: p. 312

5. ANS: a
   a. Correct. Nearly 99% of all adverse drugs reactions are related to overdose.
   b. 99%, not 75%, of all adverse drug reactions are drug overdose.
   c. 99%, not 50%, of all adverse drug reactions are drug overdose.
   d. 99%, not 33%, of all adverse drug reactions are drug overdose.

   REF: p. 312

6. ANS: a
   a. Correct. Very young patients have an underdeveloped ability to absorb, metabolize, and excrete local anesthetics, thereby increasing the likelihood of overdose.
   b. A toddler is more prone to anesthetic overdose than an adolescent is.
   c. A toddler is more prone to anesthetic overdose than a middle-aged adult is.
   d. A toddler is more prone to anesthetic overdose than a retirement-aged adult is. However, older-old patients are also predisposed to anesthetic overdose.

   REF: p. 313

7. ANS: b
   a. Quinidine competes with local anesthetics for protein-binding, not hepatic oxidative enzymes.
   b. Correct. Patients taking cimetidine experience elevated lidocaine blood levels, because cimetidine competes with the local anesthetic for hepatic oxidative enzymes.
   c. Meperidine competes with local anesthetics for protein-binding, not hepatic oxidative enzymes.
   d. Desipramine competes with local anesthetics for protein-binding, not hepatic oxidative enzymes.

   REF: p. 314
8. ANS: b  
   a. Puberty has no impact on the absorption, metabolism, or excretion of local anesthetics.  
   b. **Correct.** Impaired renal function during pregnancy decreases the excretion of local anesthetics, thereby increasing the probability of overdose.  
   c. Menopause has no impact on the absorption, metabolism, or excretion of local anesthetics.  
   d. Menstruation has no impact on the absorption, metabolism, or excretion of local anesthetics.  

REF: p. 314

9. ANS: d  
   a. Heart failure decreases liver perfusion, which increases the risk of overdose.  
   b. Hepatic disease impairs the body’s ability to break down and excrete the local anesthetic, which increases the risk of overdose.  
   c. Renal dysfunction impairs the body’s ability to break down and excrete the local anesthetic, which increases the risk of overdose.  
   d. **Correct.** Apprehension-induced stress may actually decrease the risk of local anesthetic overdose, whereas heart failure, hepatic disease, and renal dysfunction directly increase the risk of overdose.  

REF: p. 314

10. ANS: d  
    a. The administrator has complete control over the dose or volume of local anesthetic administered.  
    b. The administrator has some control over the concentration of the local anesthetic administered; the lowest effective concentration of a drug is recommended.  
    c. The administrator has complete control over the rate of local anesthetic administration.  
    d. **Correct.** The administrator has the least amount of control over the vascularity of the injection site.  

REF: pp. 314–315

11. ANS: a  
    a. **Correct.** Ester local anesthetics are relatively contraindicated for patients with atypical pseudocholinesterase.  
    b. Atypical pseudocholinesterase is a relative contraindication for ester, not amide, local anesthetics.  
    c. Atypical pseudocholinesterase is relative, not absolute, contraindication for ester local anesthetics.  
    d. Atypical pseudocholinesterase is a relative, not absolute, contraindication for ester, not amide, local anesthetics.  

REF: p. 315
12. ANS: d
   a. The maximum recommended dose (MRD) of a local anesthetic drug is decreased for
      individuals at either end of the age spectrum.
   b. The MRD of a local anesthetic drug is decreased for notably lightweight individuals;
      conversely, larger individuals can safely tolerate a larger dose.
   c. The calculated MRD should be decreased for medically compromised patients.
   d. Correct. Psychological attitude certainly influences the effect of a drug, but is not a factor
      used to determine the MRD of a local anesthetic.

REF: p. 316

13. ANS: a
   a. Correct. The administration of excessive volumes of local anesthetic is the most common
      cause of local anesthetic overdose.
   b. Local anesthetic overdose may result from unusually slow drug biotransformation, but
      administering too large a dose is the most common cause.
   c. Local anesthetic overdose may result from intravascular injection, but administering too
      large a dose is the most common cause.
   d. Local anesthetic overdose may result from especially rapid absorption, but administering
      too large a dose is the most common cause.

REF: p. 316

14. ANS: c
   a. The second statement is false. Unless specifically contraindicated by the physical status
      of the patient, or the duration of treatment, vasoconstrictors should be included in the
      local anesthetic solution.
   b. The first statement is true. Vasoconstrictors delay absorption of the local anesthetics in
      the cardiovascular system, thereby reducing systemic toxicity.
   c. Correct. The first statement is true; vasoconstrictors decrease the systemic toxicity of
      local anesthetics by delaying their absorption into the cardiovascular system. The second
      statement is false; vasoconstrictors should be included in local anesthetic solutions, unless
      specifically contraindicated.
   d. The first statement is true; the second statement is false.

REF: p. 316

15. ANS: d
   a. Performing multiple aspirations in multiple planes helps prevent adverse drug reactions,
      but slowly injecting the anesthetic solution is even more important.
   b. Using a 25-gauge needle helps prevent adverse drug reactions, but slowly injecting the
      anesthetic solution is even more important.
   c. Using an aspirating syringe helps prevent adverse drug reactions, but slowly injecting the
      anesthetic solution is even more important.
   d. Correct. Slow injection of the anesthetic solution is the most important factor in prevent-
      ing adverse drug reactions.

REF: p. 318
16. ANS: b
   a. 2 cartridges of anesthetic are needed to anesthetize the entire primary dentition.
   b. Correct. The entire primary dentition is anesthetized with only 2 cartridges of local
      anesthetic.
   c. 2 cartridges of anesthetic will anesthetize the entire primary dentition; anesthetic over-
      dose is more probable when 3 cartridges are administered to a pediatric patient.
   d. 2 cartridges of anesthetic are needed to anesthetize the entire primary dentition; overdose
      is more probable when 4 cartridges are administered to a pediatric patient.

REF: p. 319

17. ANS: b
   a. Vomiting is a sign of minimal to moderate, not high, overdose levels.
   b. Correct. Tonic–clonic seizure activity is a sign of moderate to high overdose levels.
   c. Stuttering, twitching, and tremors are signs of minimal to moderate, not high, overdose
      levels.
   d. Elevated blood pressure, heart rate, and respirations indicate minimal to moderate, not
      high, overdose levels.

REF: p. 321; Box 18-4

18. ANS: a
   a. Correct. Overdose signs and symptoms subsequent to a rapid intravascular injection
      appear within seconds.
   b. Signs and symptoms of local anesthetic overdose appear within seconds, not minutes, of
      rapid intravascular injection.
   c. Signs and symptoms of local anesthetic overdose appear within seconds, not minutes, of
      rapid intravascular injection.
   d. Signs and symptoms of local anesthetic overdose appear within seconds, not minutes or
      hours, of rapid intravascular injection.

REF: p. 322; Table 18-7

19. ANS: c
   a. PABCD, not BCDPA, is the correct sequence for basic emergency management.
   b. PABCD, not DCBAP, is the correct sequence for basic emergency management.
   c. Correct. The correct sequence for basic emergency management is PABCD.
   d. PABCD, not CABPD, is the correct sequence for basic emergency management.

REF: p. 323; Box 18-5

20. ANS: a
   a. Correct. Oxygen is essential to the management of a mild overdose reaction.
   b. Midazolam is not indicated in the management of a mild local anesthetic overdose, oxygen is.
   c. Nitrous oxide is not indicated in the management of a mild local anesthetic overdose, oxygen is.
   d. Diphenhydramine is not indicated in the management of a mild local anesthetic overdose, oxygen is.

REF: p. 323
21. ANS: a
   a. Correct. Amide local anesthetics do not exhibit cross-allergenicity.
   b. Potentially fatal allergic reactions to local anesthetics are extremely rare.
   c. Sodium bisulfite is found in all vasopressor-containing anesthetic cartridges.
   d. Allergy to one ester-type anesthetic precludes the use of other esters.

   REF: pp. 327–328

22. ANS: d
   a. Intracutaneous, not blood, testing is the primary method used to assess a local anesthetic allergy.
   b. Intracutaneous, not skin prick, testing is the primary method used to assess a local anesthetic allergy.
   c. Intracutaneous, not skin patch, testing is the primary method used to assess a local anesthetic allergy.
   d. Correct. The intracutaneous test is the most reliable, primary method used to assess a possible local anesthetic allergy.

   REF: p. 331

23. ANS: d
   a. Immediate reactions develop with allergy types I, II, and III; a delayed allergic response is distinctive of a type IV allergy.
   b. Immediate reactions develop with allergy types I, II, and III; a delayed allergic response is distinctive of a type IV allergy.
   c. Immediate reactions develop with allergy types I, II, and III; a delayed allergic response is distinctive of a type IV allergy.
   d. Correct. Type IV, cell-mediated allergies exhibit a clinical reaction days after antigenic exposure.

   REF: p. 333

24. ANS: a
   b. Respiratory symptoms appear after the development of skin reactions and gastrointestinal disturbances associated with generalized anaphylaxis.
   c. Gastrointestinal disturbances appear after the early phase of generalized anaphylaxis, the development of skin reactions.
   d. Cardiovascular involvement is the final, not first, phase of generalized anaphylaxis.

   REF: p. 334
25. ANS: c
   a. The EMS is activated immediately after the administration of epinephrine, in the case of laryngeal edema.
   b. Oxygen is administered to the patient after the EMS is activated; epinephrine is administered before any other step in the management of laryngeal edema.
   c. Correct. The immediate administration of epinephrine is indicated when a patient is unable to breathe, due to laryngeal edema.
   d. Cricothyrotomy is only indicated when all other steps have failed to secure the airway; epinephrine is administered first in the management of laryngeal edema.

REF: p. 335
Legal Considerations

Multiple Choice

1. A tort is a
   a. criminal act.
   b. criminal intent.
   c. breach of contract.
   d. private civil wrong.

2. Each principle is essential to a tort, EXCEPT one. Which is the EXCEPTION?
   a. Duty.
   b. Damage.
   c. Mens rea.
   d. Proximate cause.

3. An expert witness is most needed to prove which breach of duty?
   a. Damage is specifically defined by statute as malpractice.
   b. Damage results from obviously erroneous dental treatment.
   c. Damage results when the patient did not consent to an elective treatment.
   d. Damage occurs when the dentist fails to act as a reasonable health care provider.

4. The standard of dental care today is defined by which platform?
   a. State.
   b. Global.
   c. National.
   d. Community.

5. Which is true?
   a. Damage alone is proof of malpractice.
   b. Tort-based malpractice lawsuits are on the decline.
   c. Damage is the most difficult element of a tort to identify.
   d. A tort can be successfully defended by proving no damage.

6. State regulatory agencies can transfer the burden of proof to the defendant, because the issuance of a professional license is a right, not a privilege.
   a. Both statements are true.
   b. Both statements are false.
   c. The first statement is true; the second is false.
   d. The first statement is false; the second is true.
7. In a civil forum
   a. the rules of evidence are loosely defined.
   b. the burden of proof rests squarely with the defendant.
   c. state and federal guidelines establish the rules of evidence.
   d. the prosecution is required to prove allegations beyond a reasonable doubt.

8. Implied consent is sufficient in which scenario?
   a. The patient is mentally challenged.
   b. The patient spontaneously loses consciousness.
   c. The patient has always given consent for the same procedure.
   d. The patient has given consent to another health care provider in the dental practice.

9. Which has occurred when the patient is forced to have local anesthetic?
   a. Battery.
   b. Assault.
   c. Negligence.
   d. Conspiracy.

10. Local anesthesia administration
    a. does not predictably result in damage.
    b. is a mandatory procedure in modern dentistry.
    c. provides both diagnostic and therapeutic benefits.
    d. is a component of the operative procedure for which it is administered.

11. Which law protects the privacy and security of patient information?
    a. Occupational Safety and Health Act (OSHA).
    b. Children's Online Privacy Protection Act (COPPA).
    c. Patient Protection and Affordable Care Act (PPACA).
    d. Health Insurance Portability and Accountability Act (HIPAA).

12. Which is NOT sanctioned within HIPAA legislation?
    a. The formation of medical savings accounts.
    b. The easy transport of health insurance coverage.
    c. The authorization of a fraud and abuse control program.
    d. The mandate to increase affordability of health insurance.

13. A signed Acknowledgment of Receipt of Notice of Privacy Practices allows patient information
to be used in each case, EXCEPT one. Which is the EXCEPTION?
    a. Payment.
    b. Research.
    c. Treatment.
    d. Operations.

14. The designated privacy officer carries out which responsibility?
    a. Writes a privacy policy for the dental office.
    b. Applies new privacy policies in the dental office.
    c. Processes complaints pertaining to the office privacy policy.
    d. Limits requests for protected health information (PHI) to that which is necessary.
15. A third party, privy to personal health information, is known as a
   a. patient.
   b. business associate.
   c. health care provider.
   d. authorized representative.

16. The HIPAA Privacy Kit is available through which organization?
   a. Chicago Dental Society (CDS).
   b. American Dental Association (ADA).
   c. Academy of General Dentistry (AGD).
   d. International Association of Dental Research (IADR).

17. When an unexpected reaction occurs during the administration of local anesthetic, which entity ideally manages the complication?
   a. A responsive, trained team.
   b. A certified dental assistant.
   c. The local anesthetic administrator.
   d. An emergency medical technician.

18. Administered local anesthetic dosages should be recorded as
   a. cartridges.
   b. milliliters.
   c. milligrams.
   d. cubic centimeters.

19. Local anesthetic overdose is most difficult to foresee and avert in
   a. a small, lightweight patient.
   b. a patient taking phenytoin (Dilantin).
   c. a patient with cardiovascular disease.
   d. an undiagnosed hyperresponsive patient.

20. Allergic reactions to local anesthetic are
   a. foreseeable but rare.
   b. unforeseeable and rare.
   c. foreseeable and common.
   d. unforeseeable but common.

21. Tissue trauma from the careless or unorthodox use of an anesthetic syringe is which?
   a. Battery.
   b. Negligence.
   c. Defamation.
   d. Breach of duty.

22. Which statement is true?
   a. Vascular penetration and bleeding are preventable with careful technique.
   b. Subcutaneous emphysema is self-limiting and resolves without treatment.
   c. The dentist must be available during off hours, in the event of a complication.
   d. Accountability for self-inflicted tissue maceration rests squarely with the patient.
23. A permanent lingual nerve injury is most likely to develop following the administration of
   a. prilocaine HCl 4%.
   b. lidocaine HCl 2%.
   c. mepivacaine HCl 3%.
   d. bupivacaine HCl 0.5%

24. Which psychogenic reaction is associated with sexual affection?
   a. Agitation.
   b. Eroticism.
   c. Excitation.
   d. Somnolence.

25. Employers are liable for the actions of employees according to which legal doctrine?
   a. Malum in se.
   b. Res ipso loquitur.
   c. Malum prohibitum.
   d. Respondeat superior.

**Feedback**

1. ANS: d
   a. A tort is a private civil wrong, not a criminal act.
   b. A tort is a private civil wrong, not criminal intent.
   c. A tort is a private civil wrong, not a breach of contract.
   d. **Correct.** A tort is a private civil wrong, which is not dependent on a contract.

   REF: p. 341

2. ANS: c
   a. Duty is an essential element of a viable tort.
   b. Damage related to a breach in duty is an essential element of a viable tort.
   c. **Correct.** Mens rea is an essential element of criminal law, not tort law.
   d. Proximate cause leading to damage is an essential element of a viable tort.

   REF: p. 341

3. ANS: d
   a. Expert testimony is not required when the damage from a breach of duty is specifically
c      defined by statute as malpractice.
   b. Expert testimony is not required when the damage from a breach of duty is obviously
c      erroneous.
   c. Expert testimony is not required when the damage from a breach of duty results from
elective treatment that the patient did not consent to receiving.
   d. **Correct.** To prove that the actions of a health care professional are unreasonable, an
      expert witness is required to testify.

   REF: p. 341
4. **ANS: c**
   a. The standard of dental care today is based on national, not state, standards.
   b. The standard of dental care today is based on national, not global, standards.
   c. **Correct.** The national platform defines the modern-day standard of care.
   d. The standard of dental care today is based on national, not community, standards.

   **REF:** pp. 341–342

5. **ANS: d**
   a. Damage alone does *not* denote malpractice.
   b. Tort-based malpractice lawsuits are on the rise, not decline.
   c. Damage is the easiest, not most difficult, aspect of a tort to identify.
   d. **Correct.** A tort can be successfully defended by proving that no damage exists; damage must be present to fulfill the elements of a tort.

   **REF:** p. 342

6. **ANS: c**
   a. The second statement is false. Issuance of a professional license is considered a privilege and not a right.
   b. The first statement is true. State regulatory agencies can arbitrarily assign the burden of proof to the defendant.
   c. **Correct.** The first statement is true; regulatory agencies can arbitrarily assign the burden of proof to the defendant. The second statement is false; the rules of evidence in state agency forums are liberal because the issuance of a professional license may be considered a privilege and not a right.
   d. The first statement is true; the second is false.

   **REF:** p. 343

7. **ANS: c**
   a. The rules of evidence are strictly defined by state and federal guidelines in a civil forum.
   b. The burden of proof remains with the plaintiff in a civil forum.
   c. **Correct.** In a civil forum, the rules of evidence are established by state and federal guidelines.
   d. The plaintiff is required to prove allegations by a preponderance of evidence in a civil forum.

   **REF:** p. 343

8. **ANS: b**
   a. Consent from a legal guardian is required before treatment can be provided to a mentally challenged patient.
   b. **Correct.** Implied consent is sufficient in an emergency situation, such as when a patient loses consciousness.
   c. Consent cannot be assumed for the same procedure at a different time.
   d. Consent given to another health care provider is not transferable.

   **REF:** p. 343
9. ANS: a  
   a. Correct. Administering local anesthetic without the consent of the patient is considered battery. 
   b. Battery, not assault, takes place when local anesthetic is administered, without the consent of the patient. 
   c. Battery, not negligence, takes place when local anesthetic is administered, without the consent of the patient. 
   d. Battery, not conspiracy, takes place when local anesthetic is administered, without the consent of the patient. 

   REF: p. 344

10. ANS: c  
    a. Local anesthesia administration may foreseeably and predictably result in damage to the patient. 
    b. Local anesthesia is considered an optional, not mandatory, procedure. 
    c. Correct. Local anesthesia is at times a complete diagnostic and therapeutic treatment, as opposed to a supplementary procedure. 
    d. Local anesthesia is not automatically included as a component of another procedure. 

   REF: p. 344

11. ANS: d  
    a. The privacy and security of patient information is protected by legislation contained within HIPAA, not OSHA. 
    b. The privacy and security of patient information is protected by legislation contained within HIPAA, not COPPA. 
    c. The privacy and security of patient information is protected by legislation contained within HIPAA, not PPACA. 
    d. Correct. HIPAA protects the privacy and security of patient information. 

   REF: p. 345

12. ANS: d  
    a. HIPAA sanctions the formation of medical savings accounts. 
    b. HIPAA sanctions the easy transport of health insurance coverage. 
    c. HIPAA sanctions the authorization of fraud and abuse control. 
    d. Correct. The Patient Protection and Affordable Care Act (PPACA) mandates the increased affordability of health insurance; HIPAA does not. 

   REF: p. 345
13. ANS: b
   a. A signed *Acknowledgment of Receipt Notice of Privacy Practices* allows the use of patient information to secure payment for services rendered.
   b. **Correct.** Once procured, the *Acknowledgment of Receipt Notice of Privacy Practices* permits the use of patient information for treatment, payment, and health care operations, but not research.
   c. A signed *Acknowledgment of Receipt Notice of Privacy Practices* allows the use of patient information to provide needed treatment.
   d. A signed *Acknowledgment of Receipt Notice of Privacy Practices* permits the use of patient information to facilitate necessary health care operations.

   REF: p. 345

14. ANS: b
   a. The dentist is charged with writing the privacy policy for the dental office.
   b. **Correct.** The designated privacy officer is charged with applying new privacy policies in the office, fielding complaints, and implementing minimum requirements of HIPAA terms.
   c. The designated contact person will process the complaints, fielded by the privacy officer.
   d. The business associate agrees to limit the requests for protected health information (PHI) to that which is necessary to accomplish the task at hand.

   REF: pp. 345–346

15. ANS: b
   a. The patient is not considered a third party or entity, a business associate is.
   b. **Correct.** A business associate is a third party, privy to specific, necessary PHI.
   c. A health care provider is not considered a third party or entity, a business associate is.
   d. An authorized representative acts on behalf of the patient, and is not considered a third party or entity; a business associate is.

   REF: p. 345

16. ANS: b
   a. The HIPAA Privacy Kit is available through the ADA, not the CDS.
   b. **Correct.** The ADA can be contacted to secure a complete HIPAA Privacy Kit.
   c. The HIPAA Privacy Kit is available through the ADA, not the AGD.
   d. The HIPAA Privacy Kit is available through the ADA, not the IADR.

   REF: p. 346
17. ANS: a  
a. Correct. A responsive, trained team within the dental practice is the ideal entity to manage, and witness, unwanted complications.
b. An assistant should not be expected to handle an untoward reaction alone; a responsive, trained team is the ideal entity to manage such complications.
c. The local anesthetic administrator should not be expected to handle an untoward reaction alone; a responsive, trained team is the ideal entity to manage such complications.
d. When needed, an emergency medical technician (EMT) may be a vital adjunct member of a responsive, trained team within the dental practice to manage untoward complications.

REF: p. 347

18. ANS: c  
a. Administered local anesthetic dosages should be recorded in milligrams, not cartridges.
b. Administered local anesthetic dosages should be recorded in milligrams, not milliliters.
c. Correct. Dosages of administered local anesthetic should be recorded in milligrams.
d. Administered local anesthetic dosages should be recorded in milligrams, not cubic centimeters.

REF: p. 347–348

19. ANS: d  
a. Reducing the dosage is a prudent and reliable method of preventing anesthetic overdose in small, lightweight patients.
b. Reducing the dosage is a prudent and reliable method of preventing anesthetic overdose in patients taking concomitant agents.
c. Reducing the dosage is a prudent and reliable method of preventing anesthetic overdose in patients with a history of cardiovascular disease.
d. Correct. Overdose may occur, even when the recommended dose of local anesthetic is administered, if the patient is an undiagnosed hyperresponder.

REF: p. 348

20. ANS: a  
a. Correct. True allergic reactions to local anesthetic are rare, but foreseeable.
b. Allergic reactions to local anesthetic are foreseeable; the administrator must be competent to treat a drug-related allergic reaction in a reasonable manner.
c. Allergic reactions are rare but foreseeable; the administrator must be competent to treat a drug-related allergic reaction in a reasonable manner.
d. Allergic reactions are not common, but they are foreseeable; the administrator must be competent to treat a drug-related allergic reaction in a reasonable manner

REF: p. 348
21. ANS: d
   a. A breach of duty, not battery, is evident with the careless or unorthodox use of an anesthetic syringe.
   b. A breach of duty, not negligence, is evident with the careless or unorthodox use of an anesthetic syringe.
   c. A breach of duty, not defamation, is evident with the careless or unorthodox use of an anesthetic syringe.
   d. Correct. The careless or unorthodox use of an anesthetic syringe is considered a breach of duty.

   REF: pp. 348–349

22. ANS: c
   a. Even with careful anesthetic technique, vascular tears and bleeding can occur.
   b. Unrecognized, untreated subcutaneous emphysema can be fatal.
   c. Correct. When a complication associated with dental treatment arises, the patient must have access to the dentist, even during off hours.
   d. The practitioner bears responsibility for warning the patient and/or the patient’s guardian when the possibility of local tissue maceration exists.

   REF: p. 349

23. ANS: a
   a. Correct. A higher risk of paresthesia is associated with the administration of more concentrated anesthetic solutions, such as prilocaine HCl 4%.
   b. A 4% anesthetic solution is twice as toxic as a 2% solution; lingual paresthesia is most likely to develop following the administration of prilocaine HCl 4%.
   c. A 4% anesthetic solution is more toxic than a 3% solution; lingual paresthesia is most likely to develop following the administration of prilocaine HCl 4%.
   d. A 4% anesthetic solution is more toxic than a 0.5% solution; lingual paresthesia is most likely to develop following the administration of prilocaine HCl 4%.

   REF: p. 350

24. ANS: b
   a. Agitation is a common psychogenic reaction, which is not associated with sexual affection, but rather anxiety.
   b. Correct. Eroticism is a psychogenic reaction defined by sexual advances or affection.
   c. Excitation, the initial response to anesthetic overdose, can also surface as a strictly psychogenic reaction, but is not associated with sexual affection.
   d. Somnolence is a common psychogenic reaction, which is not associated with sexual affection, but rather drowsiness.

   REF: p. 351
25. ANS: d  
   a. Malum in se is a statute violation in which the defendant’s behavior is recognized as harmful or criminal.
   b. Res ipsa loquitur designates a behavior that speaks for itself as obviously wrong.
   c. Malum prohibitum is statute violation in which the defendant’s conduct is not necessarily criminal, but is prohibited to ensure social order.
   d. Correct. Respondeat superior is the legal doctrine that enables a plaintiff to litigate against an employer for the actions of an employee.

REF: p. 352
Multiple Choice

1. In clinical trials, intranasally (IN) administered local anesthesia successfully anesthetizes
   a. all maxillary teeth.
   b. only maxillary incisors.
   c. only maxillary incisors and canines.
   d. all maxillary teeth, excepting the molars.

2. Which statement is true?
   a. A longer anesthetic latency is achieved with a buffered anesthetic.
   b. Infected tissue is acidic, making pulpal anesthesia extremely difficult.
   c. The body buffers an injected anesthetic solution to a pH of 3.45 to 3.55.
   d. Decreasing the pH of a local anesthetic increases patient comfort during injection.

3. Which method is recommended to buffer local anesthetics in dentistry?
   a. Use pre-buffered anesthetic cartridges from the manufacturer.
   b. Inject NaHCO₃ directly into the tissues, following the local anesthetic.
   c. Expel a little local anesthetic from the cartridge and replace it with NaHCO₃.
   d. Insert the cartridge into a NaHCO₃ mixing pen, immediately before injection.

4. Intermediate-duration local anesthesia affects the soft tissues for approximately
   a. 12 hours.
   b. 3–5 hours.
   c. 60–90 minutes.
   d. 30–60 minutes.

5. The anesthetic effect dissipates as the anesthetic drug moves from the nerve into the adjacent
   soft tissues. Local anesthesia wears off more rapidly in areas of greater blood flow.
   a. Both statements are true.
   b. Both statements are false.
   c. The first statement is true; the second is false.
   d. The first statement is false; the second is true.

6. Phentolamine mesylate is
   a. concentrated in dental formulations.
   b. available under the proprietary name OraVerse.
   c. awaiting FDA approval for therapeutic use in dentistry.
   d. used to prolong the numbing sensation associated with local anesthesia.
7. In clinical trials, phentolamine mesylate produced which effect?
   a. Slight increase in the time needed to recover normal soft tissue sensation.
   b. Slight reduction in the time needed to recover normal soft tissue sensation.
   c. Significant increase in the time needed to recover normal soft tissue sensation.
   d. Significant reduction in the time needed to recover normal soft tissue sensation.

8. Phentolamine reversal is indicated in each case, EXCEPT one. Which is the EXCEPTION?
   a. Geriatric patients.
   b. Pediatric dentistry.
   c. Surgical periodontics.
   d. Special needs patients.

9. The recommended dose of phentolamine mesylate is based on the
   a. age of the patient.
   b. technique used earlier for local anesthesia administration.
   c. number of epinephrine-containing anesthetic cartridges administered.
   d. degree of anesthesia experienced by the patient at the conclusion of treatment.

10. When 3 cartridges of vasopressor-containing local anesthetic are administered, the maximum recommended dose of phentolamine mesylate is
    a. 1 cartridge.
    b. 2 cartridges.
    c. 3 cartridges.
    d. 6 cartridges.

11. The traditional approach to mandibular anesthesia is which?
    a. Halsted mandibular block.
    b. Gow-Gates mandibular block.
    c. Periodontal ligament (PDL) intraligamentary injection.
    d. Akinosi-Vazirani closed-mouth nerve block.

12. Which benefit is NOT associated with mandibular infiltration?
    a. More comfortable for patients.
    b. Reduces the total anesthetic dosage.
    c. Reduces the risk of needle-stick injury.
    d. Safer in patients with clotting disorders.

13. Which anesthetic is most effective for mandibular infiltration?
    a. Articaine 4% with epinephrine.
    b. Lidocaine 2% with epinephrine.
    c. Bupivacaine 0.5% with epinephrine.
    d. Mepivacaine 2% with levonordefrin.

14. Which amount of anesthetic is recommended for local infiltration of a mandibular molar?
    a. 0.5 mL.
    b. 0.9 mL.
    c. 1.2 mL.
    d. 1.8 mL.
15. Which vasoconstrictor enhances the effectiveness of intranasal dental anesthesia?
   a. Epinephrine.
   b. Levonordefrin.
   c. Oxymetazoline.
   d. Norepinephrine.

16. Which term describes the extreme and irrational fear of procedures involving injection?
   a. Algophobia.
   b. Odontophobia.
   c. Thanatophobia.
   d. Trypanophobia.

17. Which injection technique evolved with the introduction of computer-controlled local anesthetic delivery (C-CLAD)?
   a. Greater palatine nerve block.
   b. Posterior superior alveolar nerve block.
   c. Maxillary (V₂, second division) nerve block.
   d. Anterior middle superior alveolar nerve block.

18. Which C-CLAD innovation eliminates needle deflection during deep tissue penetration?
   a. CompuFlo technology.
   b. Bi-rotational insertion technique (BRIT).
   c. Dynamic pressure-sensing (DPS) technology.
   d. Palatal-approach anterior superior alveolar (P-ASA) nerve block.

19. The P-ASA nerve block anesthetizes
   a. all maxillary teeth.
   b. bilateral maxillary incisors.
   c. unilateral maxillary incisors and canine.
   d. unilateral maxillary molars and premolars.

20. Which benefit is NOT attributed to DPS technology?
   a. Improves tactile control.
   b. Identifies various tissue types.
   c. Ensures the injection occurs at the target location.
   d. Reveals when specific types of tissue have been penetrated.

21. The Single Tooth Anesthesia (STA) system
   a. provides real-time feedback.
   b. is incompatible with traditional injection techniques.
   c. facilitates the easy administration of intranasal anesthesia.
   d. permits high-pressure administration of local anesthetic drugs.

22. The majority of clinical trials for C-CLAD instruments focus on which population?
   a. Adult.
   b. Geriatric.
   c. Pediatric.
   d. Adolescent.
23. Performing a PDL injection with the STA-System is contraindicated in primary teeth, because precisely regulated, low-pressure anesthetic delivery damages the underlying developing tooth buds.
   a. Both statements are true.
   b. Both statements are false.
   c. The first statement is true; the second is false.
   d. The first statement is false; the second is true.

24. Compared with traditional local anesthetic injections, C-CLAD injections are
   a. less comfortable for the patient.
   b. more comfortable for the patient.
   c. equally comfortable for the patient.
   d. completely atraumatic for the patient.

25. In the dental field, C-CLAD systems are
   a. slowly growing in popularity.
   b. rapidly growing in popularity.
   c. slowly declining in popularity.
   d. rapidly declining in popularity.

Feedback

1. ANS: d
   a. Maxillary molars are not successfully anesthetized with IN anesthesia.
   b. Maxillary premolars, canines and incisors are anesthetized with IN anesthesia.
   c. Maxillary premolars are also anesthetized with IN anesthesia.
   d. Correct. Intranasally administered local anesthesia successfully anesthetizes the pulps of all maxillary premolars, canines, and incisors.

   REF: p. 356

2. ANS: b
   a. A shorter, not longer, latency is achieved with a buffered anesthetic.
   b. Correct. Pulpal anesthesia is difficult to achieve in the presence of infection, because the infected tissue is more acidic.
   c. The body buffers an injected anesthetic solution to a pH of 7.35 to 7.45, not 3.45 to 3.55.
   d. Increasing, not decreasing, the pH of a local anesthetic results in greater patient comfort during injection.

   REF: p. 357

3. ANS: d
   a. Local anesthetic manufacturers cannot produce buffered local anesthetic cartridges; NaHCO₃ must be mixed into the anesthetic within minutes of injection.
   b. Direct injection of NaHCO₃ is not recommended.
   c. A NaHCO₃ mixing pen is recommended over this previously used technique, due to increased consistency.
   d. Correct. A NaHCO₃ mixing pen is the most effective and consistent means of buffering dental cartridges of local anesthetic.

   REF: p. 358
4. ANS: b
   a. 12 hours of soft tissue anesthesia follow the administration of a long-duration local anesthetic, not an intermediate-acting anesthetic.
   b. Correct. Following the administration of an intermediate-duration local anesthetic, soft tissue anesthesia lasts an average of 3–5 hours.
   c. 3–5 hours, not 60–90 minutes, of soft tissue anesthesia follow the administration of an intermediate-duration local anesthetic.
   d. 3–5 hours, not 30–60 minutes, of soft tissue anesthesia follow the administration of an intermediate-duration local anesthetic.

REF: p. 359

5. ANS: a
   a. Correct. Both statements are correct. The anesthetic effect wears off when the drug diffuses out of the nerve, into adjacent soft tissues. The greater the blood flow in an area, the more rapid the dissipation of anesthesia.
   b. Both statements are true, not false.
   c. The second statement is true; a more rapid dissipation of anesthesia occurs in areas of greater blood flow.
   d. The first statement is true; as the anesthetic drug moves back across the nerve membrane, the anesthetic effect dissipates.

REF: p. 360

6. ANS: b
   a. Phentolamine mesylate is diluted, not concentrated, in dental formulations.
   b. Correct. OraVerse is the proprietary name of the dental formulation of phentolamine mesylate.
   d. Phentolamine mesylate is used to terminate, not prolong, the numbing sensation associated with local anesthesia.

REF: pp. 361–362

7. ANS: d
   a. Phentolamine mesylate reduces, not increases, the amount of time needed to recover normal soft tissue sensation.
   b. Phentolamine mesylate produces a significant, not slight, reduction in the amount of time needed to recover normal soft tissue sensation.
   c. Phentolamine mesylate reduces, not increases, the amount of time needed to recover normal soft tissue sensation.
   d. Correct. Phentolamine mesylate significantly reduced the amount of time needed to recover normal soft tissue sensation, in clinical trials.

REF: p. 363
8. ANS: c  
   a. Reversal of soft tissue anesthesia is indicated for geriatric patients.  
   b. Reversal of soft tissue anesthesia is indicated for pediatric dentistry.  
   c. Correct. Periodontal surgery is a case where phenolamine reversal is not indicated, as prolonged soft tissue anesthesia is welcomed to prevent postsurgical pain.  
   d. Reversal of soft tissue anesthesia is indicated for special needs patients.  

REF: p. 365

9. ANS: c  
   a. The recommended dose of phentolamine mesylate depends on the volume of local anesthetic administered, not the age of the patient.  
   b. The recommended dose of phentolamine mesylate depends on the volume of local anesthetic administered, not the technique used to administer it.  
   c. Correct. The recommended dose of phentolamine mesylate is based on the number of administered epinephrine-containing anesthetic cartridges.  
   d. The recommended dose of phentolamine mesylate depends on the volume of local anesthetic administered, not the degree of residual soft tissue anesthesia.  

REF: p. 365

10. ANS: b  
    a. The recommended dose of phentolamine mesylate is equal to the dose of local anesthetic administered, up to a maximum of 2 cartridges; 1 cartridge is an insufficient dosage.  
    b. Correct. The recommended dose of phentolamine mesylate is equal to the dose of local anesthetic administered, up to a maximum of 2 cartridges.  
    c. The recommended dose of phentolamine mesylate is equal to the dose of local anesthetic administered, up to a maximum of 2 cartridges; 3 cartridges is an overdose.  
    d. The recommended dose of phentolamine mesylate is equal to the dose of local anesthetic administered, up to a maximum of 2 cartridges; 6 cartridges is an overdose.  

REF: p. 365

11. ANS: a  
    a. Correct. The Halsted mandibular block is the traditional anesthetic technique for mandibular anesthesia.  
    b. The Gow-Gates mandibular block is an alternative approach to mandibular anesthesia from the traditional Halsted mandibular block.  
    c. The PDL intraligamentary injection is an alternative approach to mandibular anesthesia from the traditional Halsted mandibular block.  
    d. The Akinosi-Vazirani closed-mouth nerve block is an alternative approach to mandibular anesthesia from the traditional Halsted mandibular block.  

REF: p. 366
12. ANS: b  
   a. Mandibular infiltration is a more comfortable technique for patients.  
   b. Correct. Many benefits are associated with mandibular infiltration, but a reduction in total dosage is not; infiltrations are not recommended for large areas due to the necessity to administer larger total volumes of local anesthetic.  
   c. Mandibular infiltration technique reduces the risk of needle-stick injury.  
   d. Mandibular infiltration is a safer technique for patients with clotting disorders.  

   REF: p. 366

13. ANS: a  
   a. Correct. Articaine 4% with epinephrine is used effectively for mandibular infiltration.  
   b. Articaine 4% with epinephrine is used effectively for mandibular infiltration; lidocaine is less effective than articaine.  
   c. Articaine 4% with epinephrine is used effectively for mandibular infiltration; bupivacaine is not.  
   d. Articaine 4% with epinephrine is used effectively for mandibular infiltration; mepivacaine is not.  

   REF: p. 369

14. ANS: d  
   a. 1.8, not 0.5, mL of articaine is recommended to anesthetize a mandibular molar by local infiltration.  
   b. 1.8, not 0.9, mL of articaine is recommended to anesthetize a mandibular molar by local infiltration.  
   c. 1.8, not 1.2, mL of articaine is recommended to anesthetize a mandibular molar by local infiltration.  
   d. Correct. A full cartridge (1.8 mL) of articaine 4% with epinephrine is recommended when administering a local infiltration of a mandibular molar.  

   REF: p. 370

15. ANS: c  
   a. Epinephrine is not added to tetracaine in dental formulations of intranasal anesthesia, oxymetazoline is.  
   b. Levonordefrin is not added to tetracaine in dental formulations of intranasal anesthesia, oxymetazoline is.  
   c. Correct. Oxymetazoline is added to dental formulations of intranasal local anesthesia to enhance effectiveness.  
   d. Norepinephrine is not added to tetracaine in dental formulations of intranasal anesthesia, oxymetazoline is.  

   REF: p. 370
16. ANS: d  
   a. Algophobia is the irrational persistent fear of pain, not needles and injection.  
   b. Odontophobia is the irrational fear of dentistry, not needles and injection.  
   c. Thanatophobia is the irrational persistent fear of death, not needles and injection.  
   d. Correct. Trypanophobia is the extreme and irrational fear of needles and injection procedures.

   REF: p. 371

17. ANS: d  
   a. The greater palatine nerve block is a common anesthetic technique, instituted long before the advent of C-CLAD systems.  
   b. The posterior superior alveolar nerve block is a common anesthetic technique, instituted long before the advent of C-CLAD systems.  
   c. The maxillary nerve block is a common anesthetic technique, instituted long before the advent of C-CLAD systems.  
   d. Correct. The anterior middle superior alveolar nerve block is a modern injection technique that accompanied the advent of C-CLAD delivery systems.

   REF: p. 372

18. ANS: b  
   a. CompuFlo technology regulates the fluid pressure at the needle tip, whereas BRIT eliminates needle deflection.  
   b. Correct. BRIT is a C-CLAD innovation that improves the success rate of the IANB by eliminating needle deflection.  
   c. DPS technology provides visual and audible in-tissue feedback, whereas BRIT eliminates needle deflection.  
   d. The P-ASA technique anesthetizes all maxillary incisors with one injection, whereas BRIT eliminates needle deflection.

   REF: p. 372

19. ANS: b  
   a. The P-ASA nerve block does not anesthetize the maxillary canines, premolars, or molars.  
   b. Correct. The P-ASA nerve block anesthetizes all maxillary incisors, bilaterally.  
   c. The P-ASA nerve block anesthetizes bilateral maxillary central and lateral incisors, but not canines.  
   d. The P-ASA nerve block produces bilateral anesthesia of all maxillary incisors, not unilateral anesthesia of maxillary molars and premolars.

   REF: p. 372
20. ANS: a
   a. Correct. DPS technology is not credited with increased tactile control; the pen-shaped lightweight handpiece of the C-CLAD system is.
   b. DPS technology provides feedback to help identify various tissue types.
   c. DPS technology provides feedback to ensure the injection occurs at the target location.
   d. DPS technology provides feedback to reveal when specific types of tissue have been penetrated.

   REF: p. 372

21. ANS: a
   a. Correct. The STA-System provides real-time feedback of the needle tip location.
   b. The STA-System is compatible with traditional injection techniques.
   c. The STA-System facilitates newer dental injections, but not intranasal anesthesia.
   d. The STA-System permits low-pressure administration of local anesthetic drugs.

   REF: p. 373

22. ANS: c
   a. The pediatric, not adult, population is the main focus of most clinical trials and studies pertaining to C-CLAD anesthesia.
   b. The pediatric, not geriatric, population is the main focus of most clinical trials and studies pertaining to C-CLAD anesthesia.
   c. Correct. Most clinical trials and studies involving various C-CLAD systems focus on the pediatric dental population.
   d. The pediatric, not adolescent, population is the main focus of most clinical trials and studies pertaining to C-CLAD anesthesia.

   REF: p. 373

23. ANS: b
   a. Both statements are false, not true.
   b. Correct. Both statements are false. The STA-System successfully facilitates the PDL injection in the primary dentition without damaging the underlying developing tooth bud, due to precisely regulated, low-pressure anesthetic delivery.
   c. The first statement is false. PDL injections with a manual or pressure syringe are contraindicated in the primary dentition, whereas PDL injections with the STA-System are not.
   d. The second statement is false. Precisely regulated, low-pressure anesthetic delivery prevents damage to the underlying developing tooth buds.

   REF: p. 373

24. ANS: b
   a. C-CLAD injections are more, not less, comfortable for the patient.
   b. Correct. C-CLAD injections produce a consistent, measurable reduction in pain-disruptive behavior when compared with injections using a standard syringe.
   c. C-CLAD injections are more, not equally, comfortable for the patient.
   d. C-CLAD injections are not completely atraumatic, but they are more comfortable for the patient.

   REF: pp. 373–374
25. ANS: b
   a. In the dental field, C-CLAD systems are rapidly, not slowly, growing in popularity.
   b. Correct. The number of dentists using C-CLAD anesthesia is growing rapidly.
   c. In the dental field, C-CLAD systems are rapidly growing, not slowly declining, in popularity.
   d. In the dental field, C-CLAD systems are rapidly growing, not declining, in popularity.

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